NASA

Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

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NASA SP-7011(290)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 290)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in October 1986 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

NASA Scientific and Technical Information Branch 1986
National Aeronautics and Space Administration
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 125 reports, articles and other documents announced during October 1986 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA).* The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR,* including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Seven indexes — subject, personal author, corporate source, foreign technology, contract, report number, and accession number — are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1986 Supplements.

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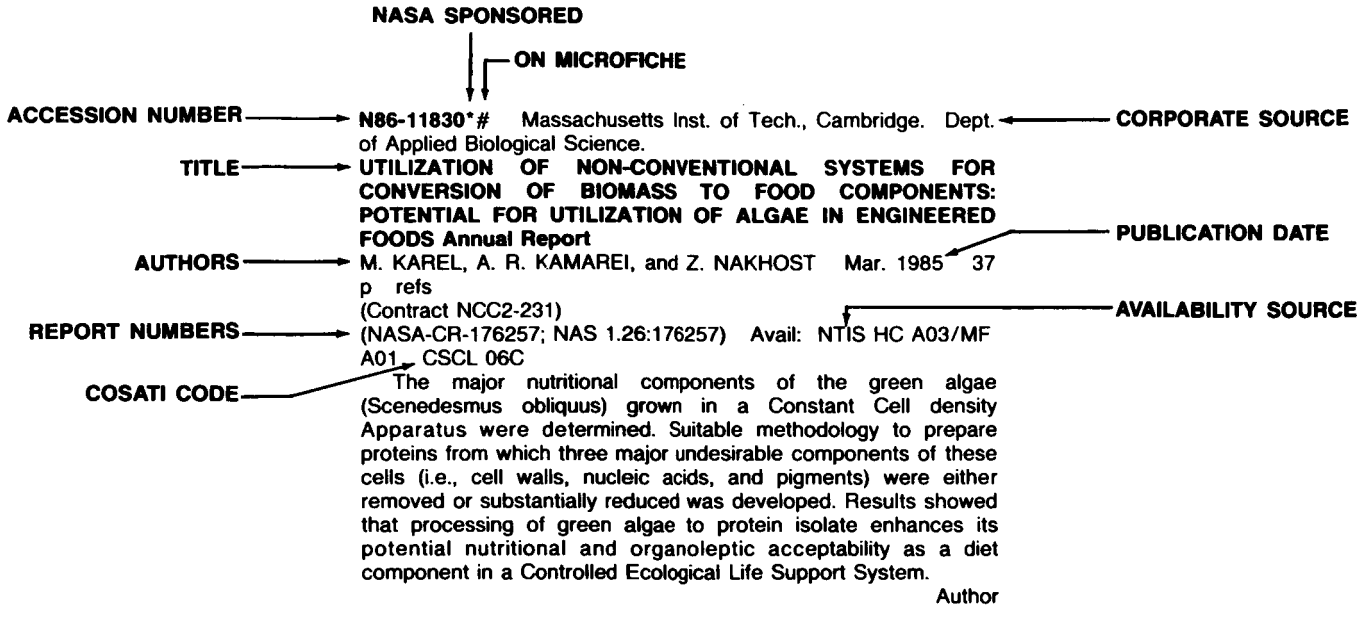
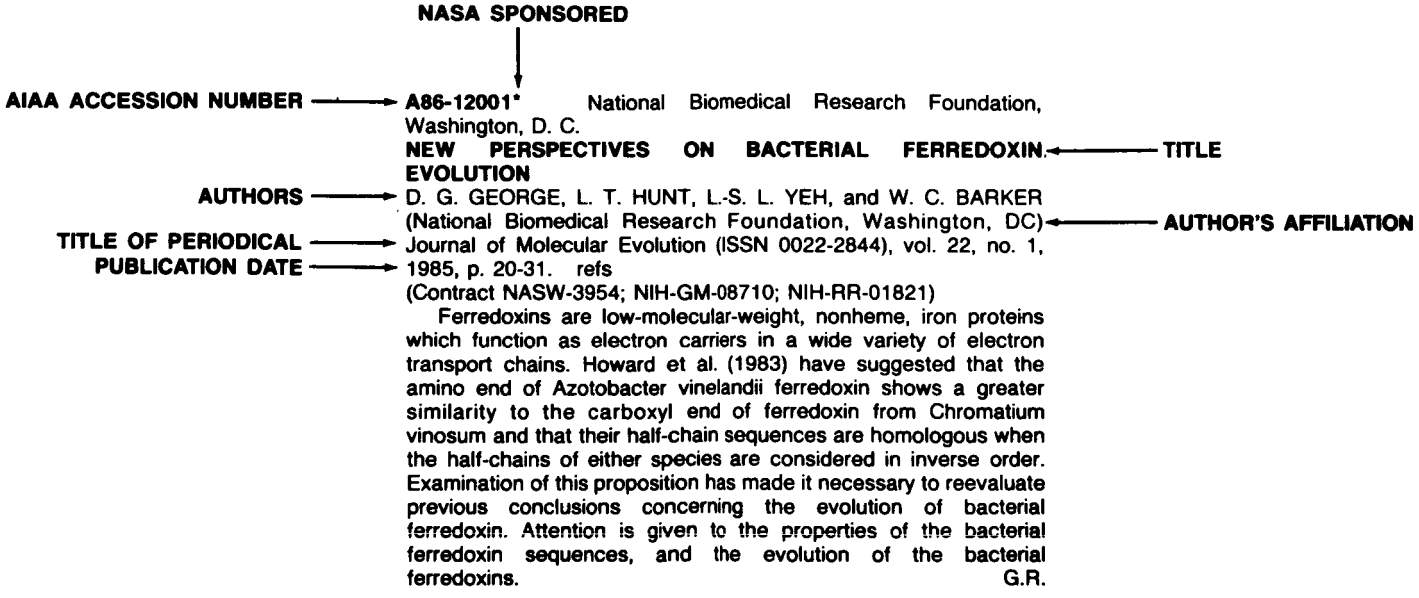
TYPICAL CITATION AND ABSTRACT FROM *STAR*



TYPICAL CITATION AND ABSTRACT FROM *IAA*



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 290)

NOVEMBER 1986

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LIFE SCIENCES (GENERAL)

Includes genetics.

A86-40519
THE NEW ANSI RF RADIATION EXPOSURE STANDARD - ITS BACKGROUND AND IMPACT
D. E. HUDSON (Lockheed Aircraft Service, Co., Ontario, CA) IN: Space tech; Proceedings of the Conference and Exposition, Anaheim, CA, September 23-25, 1985 . Dearborn, MI, Society of Manufacturing Engineers, 1985, p. 8-1 to 8-6.

The recently revised ANSI C95 RF Radiation Exposure Standard is presented with attention focused on instrumentation guidelines for measuring potentially hazardous fields. Some of the research background for the new standard is given and its impact explained. This revised standard, released in 1982, is concerned with the biological hazards of nonionizing RF radiation; it covers the radiant energy spectrum from 300 KHz to 100 Ghz. Radio frequency protection guides are indicated schematically in terms of mean squared electric and magnetic field strengths and the equivalent plane-wave free-space power density. It is noted that for mixed or broadband fields, at a number of frequencies for which there are different values of protection guides, the fraction of the protection guide within each frequency interval should not be greater than one. K.K.

A86-40666* Michigan State Univ., East Lansing.
ENHANCING EFFECTS OF GAMMA INTERFERON ON PHAGOCYTIC CELL ASSOCIATION WITH AND KILLING OF TRYPANOSOMA CRUZI
J. J. WIRTH, F. KIERSZENBAUM (Michigan State University, East Lansing), G. SONNENFELD (Louisville, University, KY), and A. ZLOTNIK (DNAX Research Institute, Palo Alto, CA) Infection and Immunity (ISSN 0019-9567), vol. 49, July 1985, p. 61-66. refs
(Contract NIH-AI-14848; NIH-AI-17041; NIH-AI-07203; NCC2-213)

Results are reported from a study of the influence gamma interferon (GIFN) and interleukin 2 (IL2) have on the capability of P388D1 cells and mouse resident peritoneal macrophages (MPM) to attach to the blood-resident parasites Trypanosoma cruzi and kill them. Cultures of trypomastigote forms of the Tulahuen strain of T. cruzi grown in bovine serum were introduced into peritoneal cells of mice, along with P388D1 cells incubated with GIFN, IL2 and both. Control cells were also maintained. Statistical analysis were then performed on data on counts of the number of dead T. Cruzi cells. The GIFN enhanced the interaction of MPM and P388D1 cells with the surface of T. Cruzi, provided the interaction was given over 12 hr to take place. A depression of the cytotoxicity of P388D1 cells was attributed to mediation by H2O2, an effect partially offset by incubation with the lymphokine GIFN. M.S.K.

A86-40669* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CARBON ISOTOPIC FRACTIONATION IN HETEROTROPHIC MICROBIAL METABOLISM
N. BLAIR, A. LEU, E. MUNOZ, J. OLSEN, E. KWONG, and D. DES MARAIS (NASA, Ames Research Center, Moffett Field, CA) Applied and Environmental Microbiology (ISSN 0099-2240), vol. 50, Oct. 1985, p. 996-1001. NASA-supported research. refs

Differences in the natural-abundance carbon stable isotopic compositions between products from aerobic cultures of Escherichia coli K-12 were measured. Respired CO2 was 3.4 percent depleted in C-13 relative to the glucose used as the carbon source, whereas the acetate was 12.3 percent enriched in C-13. The acetate C-13 enrichment was solely in the carboxyl group. Even though the total cellular carbon was only 0.6 percent depleted in C-13, intracellular components exhibited a significant isotopic heterogeneity. The protein and lipid fractions were -1.1 and -2.7 percent, respectively. Aspartic and glutamic acids were -1.6 and +2.7 percent, respectively, yet citrate was isotopically identical to the glucose. Probable sites of carbon isotopic fractionation include the enzyme, phosphotransacetylase, and the Krebs cycle.
Author

A86-40674* Florida State Univ., Tallahassee.
MICROTUBULE CONFIGURATIONS DURING FERTILIZATION, MITOSIS, AND EARLY DEVELOPMENT IN THE MOUSE AND THE REQUIREMENT FOR EGG MICROTUBULE-MEDIATED MOTILITY DURING MAMMALIAN FERTILIZATION
G. SCHATTEN, C. SIMERLY, and H. SCHATTEN (Florida State University, Tallahassee) National Academy of Sciences, Proceedings (ISSN 0027-8424), vol. 82, June 1985, p. 4152-4156. refs
(Contract NIH-HD-12913; NIH-RR-1466; NSF PCM-83-15900; NAG2-340)

A86-40675* Florida State Univ., Tallahassee.
NUCLEAR LAMINS AND PERIPHERAL NUCLEAR ANTIGENS DURING FERTILIZATION AND EMBRYOGENESIS IN MICE AND SEA URCHINS
G. SCHATTEN, H. SCHATTEN, C. SIMERLY (Florida State University, Tallahassee), G. G. MAUL (Wistar Institute of Anatomy and Biology, Philadelphia, PA), N. CHALY (Ottawa, University, Canada) et al. National Academy of Sciences, Proceedings (ISSN 0027-8424), vol. 82, July 1985, p. 4727-4731. Research supported by the Medical Research Council of Canada. refs
(Contract NIH-HD-12913; NIH-RR-1466; NIH-GM-21615; NIH-CA-10815; NIH-HD-363; NSF PCM-83-15900; NAG2-340)

Nuclear structural changes during fertilization and embryogenesis in mice and sea urchins are traced using four antibodies. The oocytes from virgin female mice, morulae and blastocytes from mated females, and gametes from the sea urchin Lytechnius variegatis are studied using mouse monoclonal antibodies to nuclear lamin A/C, monoclonal antibody to P1, human autoimmune antibodies to lamin A/C, and to lamin B. The mouse fertilization data reveal no lamins on the oocyte; however, lamins are present on the pronuclei, and chromosomes are found on the oocytes and pronuclei. It is detected that on the sea urchin sperm the lamins are reduced to acrosomal and centriolar fossae and peripheral antigens are around the sperm nucleus. The mouse sperm bind lamin antibodies regionally and do not contain antigens.

Lamins and antigens are observed on both pronuclei and chromosomes during sea urchin fertilization. Mouse embryogenesis reveals that lamin A/C is not recognized at morula and blastocyst stages; however, lamin B stains are retained. In sea urchin embryogenesis lamin recognition is lost at the blastrula, gastrula, and plutei stages. It is noted that nuclear lamins lost during spermatogenesis are restored at fertilization and peripheral antigens are associated with the surface of chromosomes during meiosis and mitosis and with the periphery of the pronuclei and nuclei during interphase. I.F.

A86-40875
A BENZODIAZEPINE USED IN THE TREATMENT OF INSOMNIA PHASE-SHIFTS - THE MAMMALIAN CIRCADIAN CLOCK
F. W. TUREK and S. LOSEE-OLSON (Northwestern University, Evanston, IL) Nature (ISSN 0028-0836), vol. 321, May 8, 1986, p. 167, 168. Research supported by the Whitehall Foundation and Upjohn Co. refs
(Contract NIH-HD-09885)

It is reported that the acute administration of triazolam, a short-acting benzodiazepine commonly prescribed for the treatment of insomnia, induces a phase shift in the circadian rhythm of locomotor activity in hamsters. This suggests a role for the GABA-containing neurones in the mammalian circadian system. D.H.

A86-40879
POSITIVELY SUPERCOILED DNA IN A VIRUS-LIKE PARTICLE OF AN ARCHAEBACTERIUM
M. NADAL, G. MIRAMBEAU, M. DUGUET (Paris VI, Universite, France), P. FORTERRE (Institut de Recherche sur le Cancer, Villejuif, France), and W.-D. REITER (Max-Planck-Institut fuer Biochemie, Martinsried, West Germany) Nature (ISSN 0028-0836), vol. 321, May 15, 1986, p. 256-258. refs
(Contract CNRS-ATP-960095)

A86-41043
RNA CATALYSIS AND THE ORIGIN OF LIFE
N. R. PACE and T. L. MARSH (Indiana University, Bloomington) Origins of Life (ISSN 0302-1688), vol. 16, no. 2, 1985, p. 97-116. refs
(Contract NIH-GM-34527)

Until the discovery of catalytic RNAs, first the self-splicing intron in Tetrahymena and then the bacterial RNAse P, cellular enzymes had always seemed to be protein in nature. The recognition that RNA can catalytically make and break phosphodiester bonds simplifies some of the assumptions required of a rudimentary self-replicating entity. Available information on the chemistry of RNA-catalyzed reactions is reviewed, with particular attention to self-splicing introns and tRNA processing by RNAse P. An explicit model for a self-replicating RNA is described. The model postulates a nucleotide binding polymerization site in the RNA, and takes advantage of intrinsic fluidity in RNA higher order structure to dissociate parent and progeny complementary strands. Author

A86-41045* Hebrew Univ. of Jerusalem, Rehovot (Israel).
THE SYNTHESIS OF PRIMITIVE 'LIVING' FORMS - DEFINITIONS, GOALS, STRATEGIES AND EVOLUTION SYNTHESIZERS
N. LAHAV (Jerusalem, Hebrew University, Rehovot, Israel) Origins of Life (ISSN 0302-1688), vol. 16, no. 2, 1985, p. 129-149. Research supported by the Fredric Burk Foundation and NASA. refs

The arbitrariness of the definition of life is discussed in relation to both the archaic biological entities that preceded cells during the Molecular Evolution era, and the hypothetical, primitive, 'living' entities that presumably can be synthesized in the laboratory. Several experimental approaches to the synthesis, detection, and characterization of 'living' entities are discussed. The experimental approaches considered for the synthesis are the constructionist strategy, the whole-environment strategy, and the modular strategy, which is a combination of the first two. The whole-environment strategy is discussed in more detail and the establishment of an Evolution Synthesizer, based on this strategy, is proposed and rationalized. The guidelines for the detection and characterization of populations and processes of 'living' entities include chemical and physical analyses, but are based mainly on the reproductive characterization of these entities. It is expected that the higher the evolutionary level of the 'living' entities, the longer and more difficult it will be to synthesize them, but the easier it will be to detect them. Author

A86-41046* Alabama Univ., Birmingham.
CHIRALLY SELECTIVE, INTRAMOLECULAR INTERACTION OBSERVED IN AN AMINOACYL ADENYLATE ANHYDRIDE
J. C. LACEY, JR., L. M. HALL, D. W. MULLINS, JR., and C. L. WATKINS (Alabama, University, Birmingham) Origins of Life (ISSN 0302-1688), vol. 16, no. 2, 1985, p. 151-156. refs
(Contract NGR-01-010-001)

The interaction between amino acids and nucleotide bases is studied. The proton NMR spectrum of N-acetylphenylalanyl-AMP-anhydride is analyzed H8 and H2 signals, two upfield signals of equal size, and five phenylalanine ring proton signals are observed in the spectrum; the upfield movement of the proton and the racemization of the N-acetyl L-phenylalanine material are examined. The differences in the position of the signals due to the diastereoisomers are investigated. The separation of the D and L amino acyl adenylates using HPLC is described. H-1 NMR spectra of the isomers are examined in order to determine which isomer displays the strongest interaction between the phenyl ring and the adenine ring. The spectra reveal that the L isomer shows the highest upfield change of both H8 and H2 signals. It is noted that the phenyl ring lies over C2 of the adenine ring with the phenyl meta and para protons extended past the adenine ring and the phenyl ortho protons. I.F.

A86-41047
CONSERVATION OF THE SECONDARY STRUCTURE OF PROTEIN DURING EVOLUTION AND THE ROLE OF THE GENETIC CODE
M. A. SOTO, A. SEPULVEDA, and J. TOJA C. (Universidad de Chile, Santiago) Origins of Life (ISSN 0302-1688), vol. 16, no. 2, 1985, p. 157-164. Research supported by the Universidad de Chile and Fondo Nacional de Investigacion Cientifica y Tecnologica. refs

In a group of modern proteins, following an algorithm described by Argyle (1980) it is demonstrated that the ordination of the amino acids in terms of the most frequent substitutions agrees with the conservation of the alpha-helix, beta-sheet, and beta-turn formation tendencies during evolution. The same correspondence has been demonstrated for the conservation of the physicochemical properties in the amino acid substitutions. Both parameters are similar in showing higher correlation with the most frequent amino acid substitutions than with the feasibility of changes at the level of the respective codons. Some kind of restrictions for the expression of the genomic changes, due to the conservation of the secondary structure of proteins and/or the physicochemical properties of the substituted amino acids, could account for the differences found between the distribution of the amino acid substitutions and the most probable codon changes. Author

A86-41784
SPINAL CORD DECOMPRESSION SICKNESS - A COMPARISON OF RECOMPRESSION THERAPIES IN AN ANIMAL MODEL
J. J. W. SYKES, J. M. HALLENBECK, and D. R. LEITCH (U.S. Navy, Naval Medical Research Institute, Bethesda, MD) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 561-568. refs
(Contract NAVY TASK M0099,PN01C,0001)

Recompression therapies for spinal cord decompression sickness (DCS) are described. Male, mongrel dogs were subjected to a dive profile that caused spinal cord DCS. The animals were treated after a delay allowing the lesion to consolidate. One group was recompressed to 60 feet of sea water (fsw) breathing 100 percent oxygen and a second group at 66 fsw breawing 66 percent oxygen. Somatosensory evoked potentials and physiological data for the subjects are analyzed. No differences are detected in the

severity, surface interval before treatment, or the maximum effect of the treatment for the two groups. The differences between the animals that responded and did not respond to the treatments are examined. The advantages and disadvantages of the two treatments are discussed, and it is noted that the efficacy of the therapies are similar. I.F.

A86-41786
POSTRADIATION REGIONAL CEREBRAL BLOOD FLOW IN PRIMATES
L. G. COCKERHAM, T. J. CERVENY, and J. D. HAMPTON (U.S. Armed Forces Radiobiology Research Institute, Bethesda, MD) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 578-582. DNA-supported research. refs

A86-41787
STIMULATING EFFECT OF SPACE FLIGHT FACTORS ON ARTEMIA CYSTS COMPARISON WITH IRRADIATION BY GAMMA RAYS
Y. GAUBIN, B. PIANEZZI, G. GASSET, H. PLANNEL, and E. E. KOVALEV (Toulouse III, Universite, France; Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 583-590. CNES-supported research. refs

The Artemia cyst, a gastrula in dormant state, is a very suitable material to investigate the individual effects of high charge and high energy cosmic particles. Monolayers of Artemia cysts, sandwiched with nuclear emulsions, flew aboard the Soviet biosatellite Cosmos 1129. The space flight stimulated the developmental capacity expressed by higher percentages of emergence, hatching, and alive nauplii at day 4-5. A greater mean life span was reported in Artemias developed from Artemia cysts hit by the cosmic heavy ions. On earth, Artemia cysts were exposed to 1, 10, 100, 200, and 400 Gy of gamma rays. A stimulating effect on developmental capacity was observed for 10 Gy; the mean life span was significantly increased for this dose. These results are discussed in comparison with previous investigations performed on earth and in space. Author

A86-43422
CIRCULATION AND OXYGEN TENSION IN THE BRAIN OF WAKEFUL RABBITS IN CONDITIONS LEADING TO MOTION SICKNESS [KROVOOBRASHCHENIE I NAPRIAZHENIE KISLORODA V GOLOVNOM MOZGE BODRSTVUIUSHCHIKH KROLIKOV PRI UKACHIVANII]
N. A. SKOROMNYI, I. T. DEMCHENKO, A. I. BEKETOV, and IU. E. MOSKALENKKO (Krymskii Meditsinskii Institut, Simferopol, Ukrainian SSR; AN SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 72, March 1986, p. 352-356. In Russian. refs

The effect of vestibular irritation, produced by rocking the animals on a swing, on circulation and oxygen tension (pO2) in the rabbit brain was investigated using the methods of hydrogen clearance and polarography. Systemic arterial pressure was measured in the same animals during a second experimental series, using a catheterized femoral artery. The swinging motion was found to induce increases in total brain circulation, as well as in circulation within regional cortical areas, with the most significant (and the first to appear) changes found in the temporal lobe, followed by the occipital and frontal lobes. The observed changes took place without significant changes in pO2, and did not coincide with the registered alterations in blood pressure, which were inconsistent and variable. It is suggested that the circulation increases were due to a direct dilatory response to the stimuli received from the vestibular analyzer, as well as to activation of the cortical metabolism. I.S.

A86-43423
HEMODYNAMIC CORRELATES OF IMMOBILIZATION STRESS IN RATS [GEMODINAMICHESKIE KORRELIATY IMMOBILIZATSIONNOGO STRESSA U KRYS]
O. S. MEDVEDEV, A. N. MURASHEV, and F. E. MEERTSUK (Institut Eksperimental'noi Kardiologii, Moscow, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 72, March 1986, p. 363-367. In Russian. refs

The effect of 46-min-long immobilization on systemic and regional hemodynamics was studied in wakeful rats, by measuring arterial pressure, pulse rate, cardiac output, and regional blood flow. Immobilization led to increases in arterial pressure (by 8-12 percent), and cardiac output (by 20-30 percent), and a decrease of total peripheral vascular resistance (by 10 percent). Blood flow increased in skeletal muscles, heart, and adrenals, but decreased in kidneys, spleen, small intestine, and testes. The observed hemodynamic changes are similar to those found in initial stages of hypertonia in man, suggesting that immobilized rats can be used for modeling this condition. I.S.

A86-43424
DEVELOPMENT OF RESPONSES TO NORADRENALIN INJECTION IN CONTROL AND COLD-ADAPTED RATS [RAZVITIE NEKOTORYKH REAKTSII NA VVEDENIE NORADRENALINA U KONTROL'NYKH I ADAPTIROVANNYKH K KHOLODU KRYS]
T. V. KOZYREVA, I. N. SINDAROVSKAIA, and P. V. LAZARENKO (Institut Klinicheskoi i Eksperimental'noi Meditsiny, Novosibirsk, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 72, March 1986, p. 377-381. In Russian. refs

A86-43425
PHASES OF MUSCULAR THERMOGENESIS UNDER EXPERIMENTAL HYPERTHYROSIS [FAZY MYSHECHNOGO TERMOGENEZA PRI EKSPERIMENTAL'NOM GIPERTIREOZE]
V. I. SOBOLEV and N. T. LAPENKO (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 72, March 1986, p. 381-384. In Russian. refs

Heat production in a contracting muscle of hyperthyroid rats was studied under aerobic and anaerobic conditions, for the purpose of correlating the thyroxine-effected heat production with a particular phase of contractile thermogenesis. Thermal effects of muscle contraction were measured by the method of Ivanov et al. (1976, 1978) in three groups of rats, among both aerobic and anaerobic categories: (1) those injected with thyroxin, (2) those injected with dinitrophenol (to uncouple the process of oxidative phosphorylation) and (3) controls. Among the aerobic animals, the values of thermal effect registered in both thyroxin- and dinitrophenol-injected rats were considerably higher (and by similar amounts) than in controls. In anaerobic conditions, the temperature effects of all three groups were equal and much lower than the effects observed in the aerobic category. The results suggest that the increases in heat production effected by thyroxine are related to the secondary, rather than to the initial, phase of contractile thermogenesis. I.S.

A86-43433* California Univ., San Francisco.
COUPLING BETWEEN THE BACTERIORHODOPSIN PHOTOCYCLE AND THE PROTONMOTIVE FORCE IN HALOBACTERIUM HALOBIUM CELL ENVELOPE VESICLES. III - TIME-RESOLVED INCREASE IN THE TRANSMEMBRANE ELECTRIC POTENTIAL AND MODELING OF THE ASSOCIATED ION FLUXES
S. L. HELGERSON, M. K. MATHEW, D. B. BIVIN, P. K. WOLBER (California, University, San Francisco), E. HEINZ (Cornell University, New York) et al. Biophysical Journal (ISSN 0006-3495), vol. 48, Nov. 1985, p. 709-719. refs
(Contract NIH-GM-27057; NIH-GM-26554; NSG-7151)

A86-43434* California Univ., San Francisco.
PHOTOCONVERSION FROM THE LIGHT-ADAPTED TO THE DARK-ADAPTED STATE OF BACTERIORHODOPSIN
T. KOUYAMA, R. A. BOGOMOLNI, and W. STOECKENIUS (California, University, San Francisco) Biophysical Journal (ISSN 0006-3495), vol. 48, Aug. 1985, p. 201-208. refs
(Contract NIH-GM-27057; NSG-7151)

The dark and light adaptation of the bR(trans)570 (bacteriorhodopsin) and bR(cis)550 isomers is analyzed. The equilibrium between the two bR isomers in light-adapted purple membrane films is studied in terms of the wavelength of actinic light and hydration levels. Absorption spectra observed after light adaptations with red and yellow light reveal that red light is less efficient in converting bR(cis)550 to bR(trans)570 than yellow light and the amount of bR(cis)550 in a light-adapted sample increases with decreasing hydration. The rate constants of dark and light adaptation are evaluated; the rate constant of dark adaptation is independent of the hydration level and the rate constant of light adaptation increases with hydration. The acceleration of a dark adaptation by red light is investigated; the dependence of the accelerated dark adaptation on the light intensity is discussed. The action spectrum of light adaptation in a purple membrane suspension is compared with the absorption spectrum of bR(cis)550; correlation between the spectra reveals that cis-to-transconversion is due to excitation of bR(cis)550 and the mechanism of cis-to-trans conversion in film is not affected by humidity levels. It is noted that the light-driven trans-to-cis conversion is a single photon process. The branching at M410 from the all-trans into the 13-cis photocycle is examined. I.F.

A86-43436* California Univ., San Francisco.
TRANSIENT PROTON INFLOWS DURING ILLUMINATION OF ANAEROBIC HALOBACTERIUM HALOBIUM CELLS
S. L. HELGERSON and W. STOECKENIUS (California, University, San Francisco) Archives of Biochemistry and Biophysics (ISSN 0003-9861), vol. 241, Sept. 1985, p. 616-627. refs
(Contract NIH-GM-27057; NSG-7151)

The roles of bacteriorhodopsin (bR), halorhodopsin (hR), and the H(+)-ATPase in the proton uptake in intact cells are examined. The Halobacterium halobium strains and solutions utilized in the experiment, and the techniques for measuring extracellular pH changes and intracellular K(+) concentrations are described. It is observed that in Halobacterium halobium strain R1, containing bR and hR, the light-driven proton uptake is divided into three transient inflows superimposed on the larger proton outflow. Under anaerobic conditions early proton uptake consists of an inflow which can be blocked with Dio-9 and a second inflow that can be eliminated by low concentrations (less than 125 nm) of triphenyltin chloride (TPT). The effects of Dio-9 and TPT on the passive proton-hydroxyl permeability of the cell membrane are investigated. A third transient light-driven proton flow observed at later times of illumination is studied. The data reveal that the first proton inflow correlates with proton dependent ATP synthesis; the second inflow is a passive uptake through an unidentified channel in response to electrogenic chloride pumping by bR and/or hR; and the third inflow correlates with the Na(+)/H(+) antiporter function. I.F.

A86-43438* Santa Clara Univ., Calif.
HALOBACTERIUM DENITRIFICANS SP. NOV., AN EXTREMELY HALOPHILIC DENITRIFYING BACTERIUM
G. A. TOMLINSON (Santa Clara, University, CA), L. L. JAHNKE, and L. I. HOCHSTEIN (NASA, Ames Research Center, Moffett Field, CA) International Journal of Systematic Bacteriology (ISSN 0020-7713), vol. 36, Jan. 1986, p. 66-70. refs

Halobacterium denitrificans was one of several carbohydrate-utilizing, denitrifying, extremely halophilic bacteria isolated by anaerobic enrichment in the presence of nitrate. Anaerobic growth took place only when nitrate (or nitrite) was present and was accompanied by the production of dinitrogen. In the presence of high concentrations of nitrate (i.e., 0.5 percent), nitrous oxide and nitrite were also detected. When grown aerobically in a mineral-salts medium containing 0.005 percent yeast extract, H. denitrificans utilized a variety of carbohydrates as sources of carbon and energy. In every case, carbohydrate utilization was accompanied by acid production. Author

A86-43440* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MEASUREMENT AND PREDICTION OF FLOW THROUGH A REPLICA SEGMENT OF A MILDLY ATHEROSCLEROTIC CORONARY ARTERY OF MAN
L. H. BACK, J. R. RADBILL, Y. I. CHO (California Institute of Technology, Jet Propulsion Laboratory, Pasadena), and D. W. CRAWFORD (Southern California, University, Los Angeles) Journal of Biomechanics (ISSN 0021-9290), vol. 19, no. 1, 1986, p. 1-17. refs
(Contract NAS7-100)

Pressure distributions were measured along a hollow vascular axisymmetric replica of a segment of the left circumflex coronary artery of man with mildly atherosclerotic diffuse disease. A large range of physiological Reynolds numbers from about 60 to 500, including hyperemic response, was spanned in the flows investigation using a fluid simulating blood kinematic viscosity. Predicted pressure distributions from the numerical solution of the Navier-Stokes equations were similar in trend and magnitude to the measurements. Large variations in the predicted velocity profiles occurred along the lumen. The influence of the smaller scale multiple flow obstacles along the wall (lesion variations) led to sharp spikes in the predicted wall shear stresses. Reynolds number similarity was discussed, and estimates of what time averaged in vivo pressure drop and shear stress might be were given for a vessel segment. Author

A86-43442* Arizona Univ., Tucson.
METABOLISM OF AMINO ACIDS BY THE ATROPHIED SOLEUS OF TAIL-CASTED, SUSPENDED RATS
S. R. JASPERS, S. JACOB, and M. E. TISCHLER (Arizona, University, Tucson) Metabolism (ISSN 0026-0495), vol. 35, March 1986, p. 216-223. refs
(Contract NAGW-227)

A86-43444* Utah Univ., Salt Lake City.
EFFECTS OF N,N,N',N'-ETHYLENEDIAMINETETRAMETHYLENE PHOSPHONIC ACID AND 1-HYDROXYETHYLIDENE-1,1-BISPHOSPHONIC ACID ON CALCIUM ABSORPTION, PLASMA CALCIUM, LONGITUDINAL BONE GROWTH, AND BONE HISTOLOGY IN THE GROWING RAT
S. C. MILLER, W. S. S. JEE, D. M. WOODBURY, and J. W. KEMP (Utah, University, Salt Lake City) Toxicology and Applied Pharmacology (ISSN 0041-008X), vol. 77, 1985, p. 230-239. refs
(Contract PHS-DE-06007; PHS-AM-31844; NAG2-108)

A86-43448* Texas Technological Univ., Lubbock.
ROLE OF CARBONIC ANHYDRASE IN BONE - PARTIAL INHIBITION OF DISUSE ATROPHY OF BONE BY PARENTERAL ACETAZOLAMIDE
A. D. KENNY (Texas Tech University, Lubbock) Calcified Tissue International (ISSN 0008-0594), vol. 37, 1985, p. 126-133. refs
(Contract NSG-2137; NIH-AM-19475)

The effectiveness of orally and subcutaneously administered acetazolamide sodium in preventing denervation-induced bone loss in rats is examined. Male Sprague-Dawley rats were treated with acetazolamide either orally by incorporation of 0.2, 0.5, or 1.5 percent concentrations in their diet for 15 days, or subcutaneously by either injection of 0.5 ml/rat of a solution containing either 20 or 100 mg/ml of the drug twice daily for 15 days or by continuous infusion of 5, 50, 500, or 1000 mg/ml of acetazolamide sodium for 8 days using an osmotic minipump. The effects of acetazolamide on body weight, food consumption, and plasma calcium content are evaluated. It is observed that parenteral administration is equally effective as oral administration in partially preventing denervation-induced bone mass changes. The data reveal that approximately 50 percent protection occurs with daily doses of 1094, 129, and 8 mg/kg body weight for the oral, subcutaneous injection, and subcutaneous infusion methods, respectively. I.F.

A86-43449* Texas Technological Univ., Lubbock.
ROLE OF CARBONIC ANHYDRASE IN BONE RESORPTION INDUCED BY 1,25 DIHYDROXYVITAMIN D3 IN VITRO
G. E. HALL and A. D. KENNY (Texas Tech University, Health Science Center, Lubbock) Calcified Tissue International (ISSN 0008-0594), vol. 37, 1985, p. 134-142. refs
(Contract NSG-2137; NIH-AM-19475)

The calvaria of 5-to-6-day-old mice treated with 1 x 10 to the -8th M of 1,25(OH)2D3 in vitro for 48 hours are examined in order to study the function of carbonic anhydrase in bone resorption. Calcium concentrations in the culture were measured to assess bone resorption. It is observed that 1,25(OH)2D3 effectively stimulates bone resorption in vitro and the resorption is dose-dependent. The effects of azetazolamide on 1,25(OH)2D3-induced bone resorption are investigated. The data reveal that 1,25(OH)2D3-induced calcium release is associated with an increase in the carbonic anhydrase activity of bone, and bone alkaline phosphatase activity is decreased and acid phosphatase activity is increased in response to 1,25(OH)2D3. A two-fold mechanism for 1,25(OH)2D3-induced bone resorption is proposed; the first mechanism is an indirect activation of osteoclasts and the second involves an interaction between hormone and osteoclast precursors. I.F.

A86-43450* Utah Univ., Salt Lake City.
THE EFFECTS OF PROSTAGLANDIN E2 IN GROWING RATS - INCREASED METAPHYSEAL HARD TISSUE AND CORTICO-ENDOSTEAL BONE FORMATION
W. S. S. JEE, K. UENO, Y. P. DENG, and D. M. WOODBURY (Utah, University, Salt Lake City) Calcified Tissue International (ISSN 0008-0594), vol. 37, 1985, p. 148-157. refs
(Contract NIH-AM-27029; NAG2-108; DE-AC02-76EV-00119)

The role of in vivo prostaglandin E2 (PGE2) in bone formation is investigated. Twenty-five male Sprague-Dawley rats weighing between 223-267 g were injected subcutaneously with 0.3, 1.0, 3.0, and 6.0 mg of PGE2-kg daily for 21 days. The processing of the tibiae for observation is described. Radiographs and histomorphometric analyses are also utilized to study bone formation. Body weight, weights of soft tissues and bones morphometry are evaluated. It is observed that PGE2 depressed longitudinal bone growth, increased growth cartilage thickness, decreased degenerative cartilage cell size and cartilage cell production, and significantly increased proximal tibial metaphyseal hard tissue mass. The data reveal that periosteal bone formation is slowed down at higher doses of PGE2 and endosteal bone formation is slightly depressed less than 10 days post injection; however, here is a late increase (10 days after post injection) in endosteal bone formation and in the formation of trabecular bone in the marrow cavity of the tibial shaft. It is noted that the effects of PGE2 on bone formation are similar to the responses of weaning rats to PGE2. I.F.

A86-43453* Texas Technological Univ., Lubbock.
ROLE OF CARBONIC ANHYDRASE IN BONE RESORPTION INDUCED BY PROSTAGLANDIN E2 IN VITRO
G. E. HALL and A. D. KENNY (Texas Tech University, Health Science Center, Lubbock) Pharmacology (ISSN 0031-7012), vol. 30, 1985, p. 339-347. refs
(Contract NSG-2137; NIH-AM-19475)

The possible role of carbonic anhydrase in bone resorption induced by prostaglandin E2 (PGE2) was studied using an in vitro neonatal mouse calvarial culture system. PGE2 (10 to the -6th M) was effective in stimulating resorption, as assessed by calcium release into culture media. This enhanced resorption was accompanied by significant increases in calvarial carbonic anhydrase activity over control values at 48 and 96 h. At 48 h, bones treated with PGE2 had 20 percent more carbonic anhydrase activity than controls. By 96 h, treated bones contained 79 percent more carbonic anhydrase activity than controls. PGE2-induced bone resorption was inhibited by the carbonic anhydrase inhibitor acetazolamide in a dose-dependent fashion from 10 to the -5th to 10 to the -4th M with 77 percent inhibition observed at 10 to the -4th M. The acetazolamide analogue CL 13,850 (N-t-butylacetazolamide), which does not inhibit carbonic anhydrase, failed to inhibit PGE2-induced resorption. These results are consistent with the hypothesis that carbonic anhydrase is a necessary component of the osteoclastic bone resorptive mechanism. Author

A86-43454* Texas Technological Univ., Lubbock.
ROLE OF CARBONIC ANHYDRASE IN BONE - PLASMA ACETAZOLAMIDE CONCENTRATIONS ASSOCIATED WITH INHIBITION OF BONE LOSS
A. D. KENNY (Texas Tech University, Health Science Center, Lubbock) Pharmacology (ISSN 0031-7012), vol. 31, 1985, p. 97-107. refs
(Contract NSG-2137; NIH-AM-19475)

The effects of acetazolamide and benzolamide on bone formation are examined. Solutions of acetazolamide and benzolamide with 1 M THAM/tris(hydromethyl)aminoethane/ or without 1 M THAM were injected subcutaneous with a minipump and into the food of Sprague-Dawley rats. The data reveal that for 8-day and 12-day infusions only acetazolamide combined with 1 M THAM caused any reduction in bone loss and there were no changes in body weights, food consumption and plasma calcium and phosphorus values. Following 8 days of infusion of acetazolamide with 1 M THAM at infusion rates of 0.5, 5.0, and 50 micrograms/hr, no reduction was detected at 0.5 microgram/hr, a 30 percent reduction occurred at 5.0 micrograms/hr and a 49 percent decrease at 50 micrograms/hr. In the benzolamide experiment it was observed that 0.5 percent of the solution in the food caused no reduction in bone loss; however, infusions with benzolamide plus 1 M THAM resulted in a bone loss reduction of 30 percent at 5.0 micrograms/hr, and a 49 percent decrease at 50 micrograms/hr. Acetazolamide levels in the plasma at 50 micrograms/hr doses are calculated as ranging from 99 ng/ml-223 ng/ml and as 46 ng/ml at 5 micrograms/hr doses. I.F.

N86-28606*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
US MONKEY AND RAT EXPERIMENTS FLOWN ON THE SOVIET SATELLITE COSMOS 1514
R. C. MAINS, ed. and E. W. GOMERSALL, ed. May 1986 284 p
(NASA-TM-88223; A-86147; NAS 1.15:88223) Avail: NTIS HC A13/MF A01 CSCL 06C

On December 14, 1983, the U.S.S.R. launched Cosmos 1514, an unmanned spacecraft carrying biological and radiation physics experiments from nine countries, including five from the United States. This was the fourth flight with U.S. experiments aboard one of the Soviet unmanned spacecraft. The Cosmos 1514 flight was limited to five days duration because it was the first nonhuman primate flight. Cosmos 1514 marked a significant departure from earlier flights both in terms of Soviet goals and the degree of cooperation between the U.S.S.R. and the United States. This flight included more than 60 experiments on fish, crawfish eggs, plants and seeds, 10 Wistar pregnant rats, and 2 young adult rhesus monkeys as human surrogates. United States specialist participated in postflight data transfer and specimen transfer, and conducted rat neonatal behavioral studies. An overview of the mission is presented focusing on preflight, on-orbit, and postflight activites pertinent to the five U.S. experiments aboard Cosmos. Author

N86-28607# Pittsburgh Univ., Pa.
ENZYME COFACTOR MODIFIED ELECTRODES Final Report, 8 Feb. 1982 - 31 Dec. 1985
L. B. WINGARD, JR. 19 Feb. 1986 6 p
(Contract DAAG29-82-K-0064)
(AD-A165604; ARO-18310.16-CH) Avail: NTIS HC A02/MF A01 CSCL 07D

This work was focused on the study of flavin cofactor enzymes for the development of improved oxidation-reduction enzyme electrodes for eventual use in biosensors or other electrochemical systems. Flavin adenine dinucleotide or glucose oxidase were immobilized on different types of carbon electrodes and tested

for electrochemical and enzymatic activity. Diffusional studies also were carried out to determine the diffusional resistance of the immobilization matrix. GRA

N86-28608# Letterman Army Inst. of Research, San Francisco, Calif.
ACUTE ORAL TOXICITY (LD50) OF GUANIDINE HYDROCHLORIDE IN RATS Final Report, 19 Jan. - 14 Feb. 1984
E. W. MORGAN, S. K. SANO, and D. W. KORTE, JR. Aug. 1985 105 p
(AD-A165747; LAIR-204; TOXICOLOGY-SER-77) Avail: NTIS HC A06/MF A01 CSCL 06T

Nitroguanidine is being evaluated by the US Army as a replacement for the nitrocellulose component of certain propellants/munitions. One of the by-products to be tested is guanidine. The hydrochloride salt was used in this evaluation of the acute toxicity of guanidine. The acute oral toxicity of guanidine hydrochloride was determined in male and female Sprague-Dawley rats by using the oral gavage single-dose method. The LD50 + or - S.E. for male rats was 556.5 + or - 29.7 mg(base)/kg and 474.6 + or - 35.3 mg(base)/kg for female rats. Clinical signs were observed in both the gastrointestinal (GI) tract and the central nervous system-neuromuscular junction (CNS-NM). Symptoms referrable to the GI tract included increased salivation, hunched posture, and diarrhea. CNS-NM signs included disorientation, increased startle reflex, hyperactivity, jumping behavior, presence of tremors/twitching and depression of grasping and righting reflexes. These results place guanidine hydrochloride in slightly toxic and moderately toxic ranges respectively. GRA

N86-28609# California Inst. of Tech., Pasadena. Div. of Biology.
INFORMATION PROCESSING IN MAMMALIAN VISUAL CORTEX Interim Report, 1 Dec. 1984 - 30 Nov. 1985
D. C. VANESSEN 26 Feb. 1986 26 p
(Contract N00014-85-K-0068)
(AD-A165832) Avail: NTIS HC A03/MF A01 CSCL 06P

This report used a combination of physiological and anatomical approaches to elucidate the functional organization of the visual cortex in the macaque monkey. One project was a single cell analysis of texture vision, using texture patterns of the type developed by Julesz for human psychophysical studies. Many cells tested in area V2 responded to static or moving texture gradients in ways which were not predictable on the basis of responses to individual texture elements and which correlated with the preattentive discriminability of these texture patterns to human observers. A second project involved the development of a computerized technique for generating two-dimensional maps of cerebral cortex. An algorithm based on simulated annealing procedures was used to construct a complete map of primary visual cortex, thereby demonstrating its suitability for dealing with anatomical data from highly convoluted regions of cortex. A third project involved the use of voltage-sensitive dyes to monitor activity patterns in visual cortex. This technique offers great promise for analyzing the organization of large neural ensembles with high spatial and temporal resolution. GRA

N86-28610# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES
19 May 1986 106 p Transl. into ENGLISH from various Russian articles
(JPRS-UBB-86-009) Avail: NTIS HC A06/MF A01

Progress is reported in U.S.S.R. biomedical and behavioral sciences. Topics discussed include: agrotechnology; biophysics; biotechnology; ecology; environment; epidemiology; food technology; genetics; immunology; laser effects; marine mammals; medicine; microbiology; molecular biology; niemr; pharmacology and toxicology; physiology; public health; and psychiatry.

N86-29494# General Accounting Office, Washington, D. C.
BIOTECHNOLOGY: THE US DEPARTMENT OF AGRICULTURE'S BIOTECHNOLOGY RESEARCH EFFORTS
Oct. 1985 80 p
(GAO/RCED-86-39BR) Avail: NTIS HC A05/MF A01

Topics discussed include: United States Department of Agriculture biotechnology research efforts; funding; accomplishments; institutions receiving grants; and the state experimental stations and colleges of veterinary science. Author

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

A86-40231
QUANTIFICATION OF PILOT FATIGUE - A NEW APPROACH TO A CRUCIAL PROBLEM
J. A. PRELOOKER (Aerolineas Argentinas, Buenos Aires, Argentina) International Journal of Aviation Safety (ISSN 0264-6803), vol. 3, Sept. 1985, p. 197-204. refs

Attention is given to a method for the quantification of pilot fatigue in human factors safety management, classifying the various causative factors involved according to their role in agression/defense response mechanisms. These factors are further subdivided as causal or generative, circumstantial or catalytic, and personal or potentiating. Emphasis is given to circumstantial or catalytic factors, which are judged to be especially relevant to the task of quantification. The method has been used over the 1979-1983 period in a study conducted by the Ibero-Americal Pilots' Organization; this study revealed that blood lactic acid levels and psychometric tests based on electronic games are highly reliable indicators of flight fatigue. O.C.

A86-40566
PHYSIOLOGICAL PROBLEMS OF ASCENT TO ALTITUDE
R. HARDING (RAF, Institute of Aviation Medicine, Farnborough, England) International Journal of Aviation Safety (ISSN 0264-6803), vol. 3, Dec. 1985, p. 242-244.

The causes, effects, and treatment of physiological hazards associated with ascent to altitude are discussed. The use of cabin pressurization systems (maintain cabin pressure at 6000-8000 ft) and oxygen masks to counter the fall in partial pressure of oxygen that occurs during ascent is examined. The symptoms of hypoxia which include impaired judgment and memory, mental and muscular incoordination, and respiratory changes are studied. The training of aircrew to recognize the personal effects of hypoxia are conducted in hypobaric chambers. The effects of rapid decompression and compression in military and civil aircraft on the lungs, gut, teeth, middle ear cavities, and sinuses are analyzed. Methods for controlling hyperventilation which results from anxiety or emotional stress during flight are described. I.F.

A86-40660*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WATER AND ELECTROLYTES
J. E. GREENLEAF and M. H. HARRISON (NASA, Ames Research Center, Moffett Field, CA) IN: Nutrition and Aerobic Exercise. Washington, DC, American Chemical Society , 1986, p. 107-124. refs

It has been found that the performance of the strongest and fittest people will deteriorate rapidly with dehydration. The present paper is concerned with the anatomy of the fluid spaces in the body, taking into account also the fluid shifts and losses during exercise and their effects on performance. Total body water is arbitrarily divided into that contained within cells (cellular) and that located outside the cells (extracellular). The anatomy of body fluid compartments is considered along with the effects of exercise on

body water, fluid shifts with exercise, the consequences of sweating, dehydration and exercise, heat acclimatization and endurance training, the adverse effects of dehydration, thirst and drinking during exercise, stimuli for drinking, and water, electrolyte, and carbohydrate replacement during exercise. It is found that the deterioration of physical exercise performance due to dehydration begins when body weight decreases by about 1 percent. G.R.

A86-40684* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PHASE SHIFTING TWO COUPLED CIRCADIAN PACEMAKERS - IMPLICATIONS FOR JET LAG
P. H. GANDER, R. E. KRONAUER, and R. C. GRAEBER (NASA, Ames Research Center, Moffett Field, CA; Harvard University, Cambridge, MA) American Journal of Physiology: Regulatory, Integrative and Comparative Physiology (ISSN 0363-6119), no. 249, 1985, p. R704-R719. refs

Two Van der Pol oscillators with reciprocal linear velocity coupling are utilized to model the response of the human circadian timing system to abrupt displacements of the environmental time cues (zeitgebers). The core temperature rhythm and sleep-wake cycle simulated by the model are examined. The relationship between the masking of circadian rhythms by environmental variables and behavioral and physiological events and the rates of resynchronization is studied. The effects of zeitgeber phase shifts and zeitgeber strength on the resynchronization rates are analyzed. The influence of intrinsic pacemakers periods and coupling strength on resynchronization are investigated. The simulated data reveal that: resynchronization after a time zone shift depends on the magnitude of the shift; the time of day of the shift has little influence on resynchronization; the strength of zeitgebers affects the rate and direction of the resynchronization; the intrinsic pacemaker periods have a significant effect on resynchronization; and increasing the coupling between the oscillators results in an increase in the rate of resynchronization. The model data are compared to transmeridian flight studies data and similar resynchronization patterns are observed. I.F.

A86-41400
AN AUTOMATED SYSTEM FOR ST SEGMENT AND ARRHYTHMIA ANALYSIS IN EXERCISE RADIONUCLIDE VENTRICULOGRAPHY
P.-W. HSIA, J. M. JENKINS, K. P. GAGE, J. T. SANTINGA (Michigan, University, Ann Arbor), Y. SHIMONI (Elscint, Ltd., Haifa, Israel) et al. IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-33, June 1986, p. 585-593. Research supported by Elscint, Ltd. refs
(Contract NSF ECS-83-51215)

A86-41645
WHAT IS THE PARAMETERS FOR THE PREDICTION OF SEASICKNESS SUSCEPTIBILITY? - ON THE POINT OF VIEW FOR VISUAL-VESTIBULAR-SOMATOSENSORY INTERACTION
S. KOTAKA (Tokyo Metropolitan Toshima Hospital, Japan), W. BLES (Amsterdam, Vrije Universiteit, Netherlands), and I. WATANABE (Tokyo Medical and Dental University, Japan) Japanese Journal of Aerospace and Environmental Medicine (ISSN 0387-0723), vol. 22, June 1985, p. 14-22. In Japanese, with abstract in English. refs

Laboratory experiments were carried out with 60 humans in an attempt to identify predictors of seasickness susceptibility. The subjects were divided into controls and a group that underwent tilting-room trials. No correlations were observed between semicircular canal imbalances and the susceptibility of seasickness. Stabilimetry measurements indicated that the subjects more susceptible to seasickness were more visually oriented than were those who did not become ill. The susceptibles also exhibited postural imbalances at lower and higher frequencies of the tilts than did those who were not susceptible. The normalcy of horizon perception during tilts and the visual-oculomotor reflex function of the susceptibles indicated that the onset of seasickness may be due to disturbances within the interaction of the visual-vestibular-somatosensory interaction. The rates and types of information available to this system are different in special environments than they are on the ground. M.S.K.

A86-41779* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
CARDIOVASCULAR RESPONSES OF WOMEN TO LOWER BODY NEGATIVE PRESSURE
M. A. B. FREY, K. L. MATHES, and G. W. HOFFLER (NASA, Kennedy Space Center; Bionetics Corp., Cocoa Beach, FL) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 531-538. refs

The effects of lower body negative pressure (LBNP) on the cardiovascular response of 20 women between 23-43 years are evaluated. Calf circumference and cardiovascular data were recorded for women in the follicular and luteal phases of the menstrual cycle at -30, -40, and -50 mm Hg LBNP. The data reveal that the two menstrual phases did not cause differences in the way women respond to LBNP. It is observed that during LBNP calf circumference is enlarged; transthoracic impedance, and heart rate are increased; stroke volume, left ventricular ejection time, the Heather Index of contractility and systolic pressure, and cardiac output are reduced; and total peripheral resistance is elevated. The experimental data are compared to Montgomery et al. (1979). It is noted that the response of women to -50 mm Hg LBNP is similar to that of men; however, women adapt to stresses on the cardiovascular system with greater heart rate adjustments. I.F.

A86-41780* Louisiana State Univ., Shreveport.
THE EFFECT OF ANTIMOTION SICKNESS DRUGS ON HABITUATION TO MOTION
C. D. WOOD, J. E. MANNO, B. R. MANNO, R. C. ODENHEIMER, and L. E. BAIRNSFATHER (Louisiana State University, Medical Center, Shreveport) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 539-542. refs
(Contract NAS9-16801)

The mechanism which allows for increased exposure to motion and accelerates habituation is investigated. The responses of 12 male and female subjects between 18-30 years rotated once a day for 5 days on the Contraves Goerz rotating chair after receiving placebo, 10 mg d-amphetamine, 0.6 mg scopolamine with 5 mg d-amphetamine, and 1.0 mg scopolamine are studied. It is observed that with placebo the subjects performed 48 more head movements than untreated subjects, 118 more movements with d-amphetamine, 176 more with 0.6 mg scopolamine with d-amphetamine, and 186 more with 1.0 scopolamine. The data reveal that exposure to rotation increases tolerance from 88 head movements on day 2 to 159 on day 4 at 17.4 rpm and with placebo; 96 to 186 at 19.9 rpm with 10 mg d-amphetamine; 111 to 273 at 20.2 rpm with scopolamine with d-amphetamine, and 141 to 279 at 22.4 rpm with 1.0 mg scopolamine. It is noted that a combination of cholinergic blocking and norepinephrine activation action is most effective in preventing the development of motion sickness and habituation is due to the greater exposure to vestibular simulation permitted by the drugs. I.F.

A86-41781
EFFECT OF SPIRONOLACTONE ON ACUTE MOUNTAIN SICKNESS
R. F. LARSEN, P. B. ROCK, C. S. FULCO, B. EDELMAN, A. J. YOUNG (U.S. Army, Research Institute of Environmental Mecidine, Natick, MA) et al. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 543-547. refs

This study examined the effectiveness of spironolactone as a prophylactic agent for the prevention of acute mountain sickness (AMS). Spironolactone, 25 mg PO QID, or placebo was administered to nine subjects in a double-blind, placebo-controlled, crossover design. Medication was given for 48 h prior to and during a 46-h exposure to 427 mm Hg (4570 m) in a hypobaric chamber. Six subjects demonstrated prevention of either the cerebral or respiratory symptoms of AMS during at least one segment of the altitude sojourn. Author

A86-41782* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DISPLACEMENT THRESHOLDS IN CENTRAL AND PERIPHERAL VISION DURING TRACKING
R. F. HAINES (NASA, Ames Research Center, Moffett Field, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 548-554. refs

The effects of stimulus duration and angular velocity on a subject's judgment of displacement threshold are examined. Twenty-six male subjects between 17-45 years with uncorrected 20:20 distance acuity and normal color perception and stereopsis studied a series of forced choice, paired comparison trials in which a long, thin, collimated horizontally oriented line moved downward through 12 angles ranging from 0.6-60 arcmin and judged which stimulus moved in each pair. The displacements were produced by 0.25, 0.5, 1, 2, and 4 sec stimulus duration and 2.5, 5, 10, and 15 deg/sec angular rates. Stimulus velocity, stimulus duration, mean threshold displacement, and mean confidence results are analyzed. It is observed that displacement judgment accuracy is increased with increasing stimulus duration. The data are compared with the results of Johnson and Leibowitz (1976) and Johnson and Scobey (1982), and good correlation with the Johnson and Leibowitz data is detected. The data reveal that threshold is based on a constant stimulus velocity over this range of durations and velocities. The data are applicable to the study of the final approach to landing of medium and large commercial jet aircraft. I.F.

A86-41783
THE DETECTION OF VARIOUS COLOR COMBINATIONS UNDER DIFFERENT CHROMATIC AMBIENT ILLUMINATIONS
D. F. NERI, S. M. LURIA, and D. A. KOBUS (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, CT) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 555-560. refs
(Contract NAVY TASK M0100,001,1022)

The purpose of this study was to reveal the effects of ambient illumination color and various foreground/background color pairings on a choice reaction time task performed on a color CRT. Six men and two women with normal color vision served as observers in a four-alternative forced choice procedure. A small (18 arcmin visual angle) colored circle appeared in the center of one of the unmarked quadrants of the screen. The observer's task was to respond as quickly as possible to this target by pressing one of four buttons corresponding to its location. It is found that target colors that were opponent to the background colors were most quickly detected. Detection was enhanced by maximizing both brightness and chromatic contrast, but brightness contrast was much more effective. Chromatic ambient lighting which was a log unit dimmer than the target luminance had no effect on performance. Author

A86-41785
RESPONSE OF ENLARGED ALVEOLAR VESSELS TO ACUTE HYPOXIA
W. C. MILLER, J. G. HEARD, D. M. SUICH, and K. M. UNGER (Humana Hospital, Pulmonary Center, Webster, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 575-577. refs

Because the postulated mechanism of high altitude pulmonary edema is inhomogeneous vasconstriction and hyperperfusion of unconstricted vessels, pulmonary blood flow through vessels larger than 10 microns was determined at baseline and during acute hypoxia sufficient to reduce arterial oxygen saturation to 65 percent. Women demonstrated a uniform response of decreasing such flow, whereas responses in men were highly variable. Hyperfusion of enlarged vessels during hypoxia is not an acute phenomenon in the majority of subjects and is therefore either unique to some individuals or a subacute occurrence. Author

A86-41788
INTRAVENTRICULAR CONDUCTION DISTURBANCES IN FLYING PERSONNEL RIGHT BUNDLE BRANCH BLOCK
G. CANAVERIS (Instituto Nacional de Medicina Aeronautica y Espacial, Buenos Aires, Argentina) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 591-596. refs

Fourty-one cases of complete right bundle branch block detected in a population of 6915 male, civilian flyers in Argentina are studied. The block was observed in 17 subjects in the first ECG and in 24 after normal ECG tracing. The effects of complete right bundle branch block development on the electrical axis are analyzed. It is observed that the block is most prevalent in men in the 35-44 year range. The cause of this block is investigated. It is noted that complete right bundle branch block etiology in asymptomatic subjects is uncertain and prognosis depends on the underlying disease. I.F.

A86-41789
CARDIOVASCULAR EPIDEMIOLOGY, EXERCISE, AND HEALTH - 40-YEAR FOLLOWUP OF THE U.S. NAVY'S '1000 AVIATORS'
E. YORK, R. E. MITCHELL, and A. GRAYBIEL (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, FL) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 597-599. refs

A86-41790
A BLITZ OF BENDS - DECOMPRESSION SICKNESS IN FOUR STUDENTS AFTER HYPOBARIC CHAMBER TRAINING
S. E. PIWINSKI, R. A. MITCHELL (U.S. Army, School of Aviation Medicine, Fort Rucker, AL), G. A. GOFORTH (U.S. Army, Flight Surgeon's Office, Fort Benning, GA), H. J. C. SCHWARTZ, and F. K. BUTLER, JR. (U.S. Navy, Panama City, FL) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, June 1986, p. 600-602.

Four cases of decompression sickness in U.S. Army parachutists, which occurred after exposure in a hypobaric chamber to 9,908.5 m followed by a rapid compression to 6,859.8 m, are analyzed. The high altitude-low opening (HALO) flight profile followed by the parachutists is described. The diagnosis and treatment of the sickness are discussed. The oxygen regulators and oxygen supply of the chamber were checked, and it was determined the regulators were functioning properly and the oxygen was pure. The cause of the decompression sickness is examined. It is noted that this HALO flight profile is not utilized by the U.S. Navy or U.S. Air Force and should be considered unsafe for future training. I.F.

A86-43437* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE BIOLOGICAL HAZARD OF GALACTIC ANTINUCLEI
J. W. WILSON, L. W. TOWNSEND (NASA, Langley Research Center, Hampton, VA), and W. W. BUCK (Hampton University, VA) Health Physics (ISSN 0017-9078), vol. 50, May 1986, p. 666, 667. refs

The interaction of antinuclei in the galactic cosmic-ray beam with biological systems is studied. A nuclei-antinuclei annihilation event observed in nuclear emulsion near the end of the slowing-down trajectories of singly charged particle is discussed. An annihilation event that occurred by capture of the antinucleus into an atomic orbital followed by cascade to or near the ground atomic state and subsequent annihilation with the nuclear material of the atom is described. Microdosimetric quantities relevant to potential biological hazards are estimated. The average linear-energy-transfer spectrum for galactic cosmic ray antinuclei annihilation events in tissues is presented. It is observed that the annihilation in tissues occurs mainly in O and the heavier elements around K. I.F.

N86-28611# Joint Publications Research Service, Arlington, Va.
RESISTANCE, EXCHANGE, AND CAPACITANCE FUNCTIONS OF SKELETAL MUSCLE VESSELS IN ACUTE HYPOXIC HYPOXIA
B. I. TKACHENKO and Y. I. IBRAGIMOV *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-009) p 71-72 19 May 1986 Transl. into ENGLISH from Fiziologicheskiy Zhurnal SSSR (Leningrad, USSR), v. 81, no. 10, Oct. 1985 p 1229-1237
Avail: NTIS HC A06/MF A01

It is shown that acute hypoxia (10 percent O2 in nitrogen) increases precapillary resistance of skeletal muscle vessels in hemodynamically isolated cats. Postcapillary resistance was reduced by about 30 percent together with capillary hydrostatic pressure and the capillary filtration coefficient (CFC). Similar changes were observed in the denervated vascular bed under cross circulation. B.W.

N86-28612* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 286)
Jul. 1986 77 p
(NASA-SP-7011(286); NAS 1.21:7011(286)) Avail: NTIS HC A05 CSCL 06E

This bibliography lists 213 reports, articles and other documents introduced into the NASA scientific and technical information system in June 1986. Author

N86-28613*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CREW FACTORS IN FLIGHT OPERATIONS. PART 4: SLEEP AND WAKEFULNESS IN INTERNATIONAL AIRCREWS
R. C. GRAEBER Feb. 1986 113 p
(Contract NCC2-302)
(NASA-TM-88231; A-86182; NAS 1.15:88231) Avail: NTIS HC A06/MF A01 CSCL 06P

Physiological recordings of sleep and wakefulness in operating international (B-747) flight crews were obtained. Crews spent their first layover (48 h) of a trip in a sleep laboratory where standardized EEG, electro-oculograph (EOC), and electromyograph (EMG) sleep recordings were carried out whenever volunteers chose to sleep. During periods of wakefulness they underwent multiple sleep latency tests every 2 h in order to assess daytime drowsiness. The same standardized recordings were carried out at a home-based laboratory before departure. Approximately four crews each participated in flights over 7 to 9 time zones on five routes. All participants were encouraged to use whatever sleep-wake strategies they thought would provide them with the most satisfactory crew rest. Overall, layover sleep quality was not seriously disturbed, but eastward flights produced greater sleep disruption. The contributors of individual factors and the usefulness of various sleep strategies are discussed in the individual laboratory reports and in an operational summary. Author

N86-28614# Armed Forces Radiobiology Research Inst., Bethesda, Md.
AFRRI (ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE) Annual Research Report, 1 Oct. 1984 - 30 Sep. 1985
30 Sep. 1985 101 p
(AD-A165810; AFRRI-ARR-19) Avail: NTIS HC A06/MF A01 CSCL 06R

The Armed Forces Radiobiology Research Inst.(AFRRI) is the primary DOD facility for scientific research in the field of radiobiology and related matters. It conducts applied and basic research that is essential for the operational and medical support of the DOD. The work carried out by its five scientific departments is noted. Operation, maintenance, and quality control of all AFFRI radiation sources, radiation dosimetry and estimation of tissue doses at various depths in different kinds if tissues; development and use of nuclear medicine and magnetic spectroscopic techniques for determining radiation damage in animals and model systems. GRA

N86-28615# Health Effects Research Lab., Research Triangle Park, N. C.
APPLICATION OF PORTABLE MICROPROCESSOR-BASED SYSTEM FOR ELECTROPHYSIOLOGICAL FIELD TESTING OF NEUROTOXICITY
D. OTTO, S. BAUMANN, and G. ROBINSON Jan. 1986 19 p refs Prepared in cooperation with Illinois Univ., Urbana-Champaign and North Carolina Univ., Chapel Hill
(PB86-145471; EPA-600/D-86-008) Avail: NTIS HC A02/MF A01 CSCL 06T

A portable microprocessor based system designated PEARL II was developed for neurotoxicity testing in human populations. PEARL II provides a flexible and powerful data acquisition capability to record sensory evoked potentials (auditory, visual, and somatosensory), event related slow potentials (CNV, P300), and behavioral measures. PEARL II was mounted in a mobile laboratory to facilitate field testing. Data obtained in pediatric lead studies are provided for illustration. GRA

N86-29495*# Stanford Univ., Calif. Div. of Cardiology.
EFFECTS OF SIMULATED WEIGHTLESSNESS ON REGIONAL BLOOD FLOW SPECIFICALLY DURING CARDIOVASCULAR STRESS Final Report
D. C. HARRISON 1986 15 p
(Contract NCC2-126)
(NASA-CR-177117; NAS 1.26:177117) Avail: NTIS HC A02/MF A01 CSCL 06S

Significant changes in the cardiovasular system of humans and animals have been observed following exposure to prolonged periods of weightlessness during space flight. Although adaption to weightlessness is relatively uncomplicated, marked changes in cardiovascular deconditioning become evident upon return to normal gravity, including orthostatic hypotension and tachycardia. Some evidence that myocardial degeneration occurs has been demonstrated in animals who have been immobilized for two months. Also, evidence of possible loss of myocardial mass following manned space flight has been obtained by means of echocardiographic studies. These findings have serious implications in light of the increasing frequency and duration of Space Shuttle missions and the prospect of extended space station missions in the future. A number of both military and civilian investigators, including middle-aged scientists, will probably encounter prolonged periods of weightlessness. It has been imperative, therefore, to determine the effects of prolonged weightlessness on cardiovascular deconditioning and whether such effects are cumulative or reversible. The research project conducted under NASA Cooperative Agreement NCC 2-126 was undertaken to determine the effects of prolonged simulated weightlessness on regional blood flow. Research results are reported in the three appended publications. Author

N86-29496*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SKELETAL RESPONSE TO SHORT-TERM WEIGHTLESSNESS Final Technical Report
T. J. WRONSKI and E. R. MOREY-HOLTON 1986 16 p
(Contract NCC2-337)
(NASA-TM-88778; NAS 1.15:88778) Avail: NTIS HC A02/MF A01 CSCL 06S

Male Sprague Dawley rats were placed in orbit for 7 days aboard the space shuttle. Bone histomorphometry was performed in the long bones and lumbar vertebrae of flight rats and compared to data derived from ground based control rats. Trabecular bone mass was not altered during the first week of weightlessness. Strong trends were observed in flight rats for decreased periosteal bone formation in the tibial diaphysis, reduced osteoblast size in the proximal tibia, and decreased osteoblast surface and number in the lumbar vertebra. Histologic indices of bone resorption was relatively normal in flight rats. The results indicate that 7 day of weightlessness are not of sufficient duration to induce histologicaly

detectable loss of trabecular bone in rats. However, cortical and trabecular bone formation appear to be diminished during the first week of space flight. Author

N86-29497*# California Univ., San Diego.
CARDIAC RESERVE DURING WEIGHTLESSNESS SIMULATION AND SHUTTLE FLIGHT Final Report, 15 Oct. 1984 - 14 Oct. 1985
A. L. GOLDBERGER Oct. 1985 32 p
(Contract NCC2-335)
(NASA-CR-177085; NAS 1.26:177085; LR-7552) Avail: NTIS HC A03/MF A01 CSCL 06S

Bedrest deconditioning is suspected to reduce cardiac function. However, quantitation of subtle decreases in cardiac reserve may be difficult. Normal subjects show considerable variability in heart rate response, reflected by a relatively broadband interbeat interval power spectrum. We hypothesized that the deconditioning effects of bedrest would induce narrowing of this spectrum, reflecting a reduction in the autonomically-modulated variability in heart rate. Ten aerobically conditioned men (average 35-50 years) underwent orthostatic tolerance testing with lower body negative pressure pre-bedrest and after 10 days of bedrest, while on placebo and after intravenous atropine. Spectra were derived by Fourier analysis of 128 interbeat interval data sets from subjects with sufficient numbers of beats during matched periods of the protocol. Data suggest that atropine unmasks the deconditioning effect of bedrest in athletic men, evidenced by a reduction in interbeat interval spectral power compared with placebo. Spectral analysis offers a new means of quantitating the effects of bedrest deconditioning and autonomic perturbations on cardiac dynamics. Author

N86-29498*# Vanderbilt Univ., Nashville, Tenn. School of Medicine.
WEIGHTLESSNESS SIMULATION: PHYSIOLOGICAL CHANGES IN FAST AND SLOW MUSCLE Final Technical Report, 1 Jun. 1984 - 31 May 1985
W. D. DETTBARN 31 May 1985 22 p
(Contract NAG2-301)
(NASA-CR-176945; NAS 1.26:176945) Avail: NTIS HC A02/MF A01 CSCL 06P

The role of the intact motor system in the maintenance of normal skeletal muscle structure and function were examined. Using a multidisciplinary approach, changes in slow and fast muscle were examined in response to three experimental paradigms: motor nerve denervation, spinal cord section, and nonsurgically induced disuse (or hypokinesia). The effects of use and disuse on the free radical scavenging system in relation to the mitochondrial oxidative metabolism in fast twitch and slow twitch muscle were also investigated. The effects of denervation and reinnervation on cuprozinc superoxide dismutase, manganosuperoxide dismutase, glutathione peroxidase, fumarase, cytochrome c oxidase, and GSH-peroxidase were studied. Changes in biochemical, histochemical, and physiological characteristics of the predominately slow (type 1) soleus and predominately fast (type 2) extensor digitorum longus are correlated with electromyogram assessment of muscle activation. B.G.

N86-29499# Sea-Space Research Co., Inc., Harvey, La.
EVALUATION OF THE USE OF HYDROGEN-OXYGEN AS A BREATHING GAS IN DEEP-SEA DIVING
P. EDEL 1986 31 p
(Contract N00014-85-C-0592)
(AD-A165797) Avail: NTIS HC A03/MF A01 CSCL 06K

An attempt is made to define the state-of-the-art for the use of Hydrogen-Oxygen mixtures for diving operations. Information relative to past and current research efforts in the U.S. and foreign countries is compiled. This information is utilized to identify possible areas of application with this mixture in appropriate conditions and in areas in which hydrogen-oxygen mixtures could offer physiological advantages not possible with currently used breathing mixtures. Further research is needed prior to operational use of this mixture, and recommendations for current and future research and development needs are included in this report. Hydrogen-oxygen mixtures have shown sufficient advantage to warrant further research. Present experience indicates that H2-02 mixtures offer some potential advantages over present helium-oxygen bounce diving applications for operations where on-site gas storage space is limited and/or resupply of breathing gas mixtures are a potential problem. Present experience indicates that H2-He-02 mixtures offer some potential advantages over present helium-oxygen saturation diving operations at depths where increased diver performance and reduction of breathing resistance is an important factor. Hydrogen narcosis effects and decompression requirements are the major primary physiological research areas requiring investigation prior to possible applications of such mixtures. GRA

N86-29500# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
METHOD FOR THE DETERMINATION OF RESPIRATORY WORK IN PROTECTIVE MASKS
I. BERGLUND and K. NYREN Jun. 1985 27 p In SWEDISH; ENGLISH summary
(FOA-C-40213-C2; ISSN-0347-2124; ESA-86-97042) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR 50

A method for estimating respiratory work by measuring flow and pressure in a protective mask on a dummy head, during inhalation and exhalation, with a respiratory pump is described. Data acquisition, evaluation, and graphical presentation for a respiratory cycle are performed with a laboratory computer. Malfunction of the inlet valve may lead to leakage so that expired air wrongly passes through the filter. Actually the user of the mask would compensate for this by increasing the respired volume, thus increasing the respiratory work. In the described method this leakage indicates, on the contrary, lower respiratory workload. ESA

N86-29501# Chicago Univ., Ill. Dept. of Radiology.
MTF'S AND WIENER SPECTRA OF RADIOGRAPHIC SCREEN-FILM SYSTEMS. VOLUME 2: (INCLUDING SPEEDS OF SCREENS, FILMS AND SCREEN-FILM SYSTEMS)
K. DOI, Y. KODERA, L. N. LOO, H. P. CHAN, and Y. HIGASHIDA Mar. 1986 110 p Sponsored by FDA
(Contract PHS-223-78-6003; PHS-223-81-6014)
(PB86-184934; HHS/PUB/FDA-86-8257-VOL-2; FDA/CDRH-86/103-VOL-2) Avail: NTIS HC A06/MF A01 CSCL 06E

Volumes I and II of the report constitute a consistent, quantitative evaluation of the physical imaging performance of most currently available radiographic screens and films. Volume I (HHS Publication FDA 82-8187, April 1982) reported measurements of MTF's and Wiener spectra of a large number of screen-film systems and described the methodology. Volume II reports measurement (using the same methodology) of MTF's and Wiener spectra of additional systems. Volume II also reports absolute speeds (determined according to ANSI Standard PH 2.43-1982) for selected systems and relative speeds for a large group of screens and films; methodology for these measurements is described in detail. GRA

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

A86-40476
SIMULATORS; PROCEEDINGS OF THE CONFERENCE, NORFOLK, VA, MARCH 3-8, 1985
J. S. GARDENIER, ED. (U.S. Coast Guard, Washington, DC) La Jolla, CA, Society for Computer Simulation (Simulation Series. Volume 16, No. 1, 1985), 1985, 200 p. For individual items see A86-40477 to A86-40486.

Flight simulator upgrades and modifications are considered along with relationships among aircrew performance measures for evaluating flight simulator training effectiveness, representation of ground reaction forces as a function of the position of the center of pressure during gait, dynamic process simulators for steel rolling plants, and the simulation of ferrofluidic seals for optimum design. Attention is also given to enhancement options for improving the effectiveness of training with nuclear power plant simulators, human performance simulation, the integration of surface warfare simulation with instructional training techology, training simulator evaluation, and numerical simulation of two-phase flow in pipe networks. Other topics explored are related to the use of simulators for the training and evaluation of nuclear plant personnel, the use of standard computer terminals for the instructor console on a real-time nuclear reactor training simulator, and the importance of color displays in visual flight simulation. G.R.

A86-40479
RELATIONSHIPS AMONG AIRCREW PERFORMANCE MEASURES FOR EVALUATING FLIGHT SIMULATOR TRAINING EFFECTIVENESS
R. T. NULLMEYER (USAF, Human Resources Laboratory, Williams AFB, AZ) and M. R. ROCKWAY (Dayton, University, Williams AFB, AZ) IN: Simulators; Proceedings of the Conference, Norfolk, VA, March 3-8, 1985 . La Jolla, CA, Society for Computer Simulation, 1985, p. 13-17.

Transfer of training from the C-130E Weapon System Trainer (WST) to C-130E aircraft was evaluated for approaches, landings, and engine-out go-arounds. Two groups of student copilots with no previous experience in the C-130 aircraft were used as subjects. One group (test) received training in the C-130 WST prior to transferring to the aircraft while the other group (control) did not. Overall student proficiency, amount of instructor assistance, and selected flight parameters were monitored during the performance of each task in the aircraft. Several variations of the above measures were analyzed to compare the inflight performance of the two groups. In general, the test group received significantly higher ratings of overall proficiency and required less instructor assistance in the aircraft than did the control group. The selected flight parameters, on the other hand, were insensitive to the differences between the two groups. The implications of these findings for understanding the nature of aircrew learning and the determination of flight simulator training effectiveness are discussed. Author

A86-40480
HUMAN PERFORMANCE SIMULATION - COMBINING THE DATA
V. J. GAWRON (Calspan Corp., Buffalo, NY) and J. POLITO (Sperry Corp., Sugarland, TX) IN: Simulators; Proceedings of the Conference, Norfolk, VA, March 3-8, 1985 . La Jolla, CA, Society for Computer Simulation, 1985, p. 61-65. refs
(Contract MDA903-81-C-AA06)

As part of a recent program to develop computer models of human performance and decision-making (Model of Operator Performance in Air Defense System, MOPADS), a method was developed to combine human performance data from multiple sources into a single measure of predicted task performance time or probability. In the case where multiple equations are relevant to the current state being simulated, the derived completion times or probabilities are combined in a weighted equation to produce a single derived probability. The weight for each calculated time or probability is the number of independent variables represented in the moderator equation from which that particular value was calculated. This approach is based on the law of diminishing returns which states that the inclusion of more predictor variables in a regression equation will increase the total amount of variance in the data accounted for by the equation; however, each new variable added will account for a lesser portion of the total variance than any of the variables that preceded it. Author

A86-40482
RESOLUTION AND SCENE DETAIL PERFORMANCE OF THE VISUAL SYSTEM IN FLIGHT SIMULATION
R. E. CLAPP (Boeing Military Aircraft Co., Wichita, KS) IN: Simulators; Proceedings of the Conference, Norfolk, VA, March 3-8, 1985 . La Jolla, CA, Society for Computer Simulation, 1985, p. 169-173. refs

Engineers and designers working in simulation are frequently unaware of many of the aspects of the physical processes of vision and usually completely unaware of the psychophysical processes connected with how the human vision perceives the simulated (or real) world. This paper considers the human visual parameters (resolution, detection levels of scene detail, luminosity effects, 'traps' of vision, various psychophysical processes, etc.), how these parameters interact with the presented visual simulation, and how the proper application of these parameters to the techniques of design or visual simulations could produce more acceptable systems. Author

A86-40484
IMPORTANCE OF COLOR DISPLAYS IN VISUAL FLIGHT SIMULATION
R. E. CLAPP (Boeing Military Aircraft Co., Wichita, KS) IN: Simulators; Proceedings of the Conference, Norfolk, VA, March 3-8, 1985 . La Jolla, CA, Society for Computer Simulation, 1985, p. 179-182. refs

The characteristics of color and the advantages of its use in displays are considered. Attention is given to the three dimensions of color, variation of hue discrimination with illuminance, optimum luminance for displaying color, variation in color discrimination, target detection as a function of resolution and as a function of contrast, a summary of color effects, the resolution of displays, and resolution requirements. It is concluded that despite the poorer detection level resolution of color display compared to black and white displays, color displays provide better recognition and identification of objects in the display. Color displays are more acceptable to observers due to a closer approach to real world conditions (more realism). It is pointed out that the major advantage of the use of color displays is related to an increase in the information levels of the display. G.R.

A86-40485
THE HUMAN DUAL VISUAL SYSTEMS - THEIR IMPORTANCE IN SIMULATION
R. E. CLAPP (Boeing Military Aircraft Co., Wichita, KS) IN: Simulators; Proceedings of the Conference, Norfolk, VA, March 3-8, 1985 . La Jolla, CA, Society for Computer Simulation, 1985, p. 183-187. refs

The human visual system possesses a capability of dual mode operation in sensing the visual environment. These modes of operation are given the names of 'Ambient Visual Mode', and 'Focal Visual Mode'. The ambient mode mediates the wide field of view scene organization and intersensory areas, while the focal mode supplies the detail structure. The operation of the dual modes and their interrelationship establish the visual world as perceived by the observer. This paper discusses the operation of each of the visual modes, their interrelationship, their importance of what we perceive, and how these factors may be employed in improving visual display systems. Author

A86-40571
THE PERSONALITY AND PHYSIQUE OF UNDERGRADUATE AVIATION MAJORS
I. C. ADAMS (University College of Arts, Science and Education, Manama, Bahrain) and W. BOLONCHUK (North Dakota, University, Grand Forks) International Journal of Aviation Safety (ISSN 0264-6803), vol. 3, Dec. 1985, p. 280-283. refs

The personality and physique of 31 male undergraduate aviation majors and 100 male nonaviation majors at the University of North Dakota, U.S., are evaluated. The Cattell sixteen personality factor questionnaire and the Heath-Carter somatotype method were utilized in this study. The data reveal that the aviation majors scored higher than nonaviation majors in ego strength, dominance, surgency, conscientiousness, venturesomeness, self-sentiment, experimenting, pathemia, and independence, and lower than nonmajors in tenseness. It is observed that both groups were basically mesomorphic with secondary endomorphy; however, the aviation majors were lower in mesomorphy and ectomorphy than nonmajors. I.F.

A86-41799
AIR FORCE USES COMPUTER LESSONS TO TRAIN INSTRUCTORS, FLIGHT CREWS
Aviation Week and Space Technology (ISSN 0005-2175), vol. 124, June 2, 1986, p. 54, 55, 57.

Two engineering research demonstrators are being used at Dyess Air Force Base to train instructors and operating crews of the B-1B bomber, over the course of 272 hrs of computer-aided instruction. Each real time, man-in-the-loop simulator encompasses all B-1B crew stations, which are those of pilot and copilot on the flight deck, and offensive systems officer and defensive systems officer in the aft position. To aid the learning process, colors of the simulator graphics are coordinated with those used in the instruction texts. O.C.

N86-28616# California Univ., Santa Barbara.
COMPONENTS OF SPATIAL ABILITY Final Report, Jun. 1981 - Sep. 1984
J. W. PELLEGRINO, D. L. ALDERTON, and J. W. REGIAN 24 Mar. 1986 68 p
(Contract N00014-81-C-0616; NR PROJ. RR0-4204)
(AD-A165694) Avail: NTIS HC A04/MF A01 CSCL 05J

The goal of this project was to identify information processing components of spatial ability. A summary paper is presented that reviews major psychometric analyses of spatial ability as they relate to theories of information processing. The primary emphasis in the review is of studies isolating individual differences in components of spatial information processing. Research is also reviewed on the acquisition of spatial processing skills. The final section considers implications of this line of research for issues of assessment, particularly as it relates to modern technologies for testing. GRA

N86-28617# Wisconsin Univ., Madison. Center for Education Research.
INEXPERT CALIBRATION OF COMPREHENSION Technical Report, Sep. - Dec. 1985
A. M. GLENBERG and W. EPSTEIN 1 Mar. 1986 48 p
(Contract N00014-85-K-0644; NR PROJ. RR0-4206)
(AD-A165701; WCER-86-3) Avail: NTIS HC A03/MF A01 CSCL 05J

Students with a wide range of coursework in physics or music theory read expositions in both domains. After reading, for each text students provided a judgment of confidence in ability to verify inferences based the central principle of the text. The primary dependent variable was calibration of comprehension, the degree of association between confidence and performance in the inference test. Two results of most interest were expertise in a domain was inversely related to calibration and subjects were well-calibrated across domains. Both of these results can be accommodated by a self-classification strategy: Confidence judgments are based on self-classification as expert or non-expert in the domain of the text, rather than an assessment of the degree to which the text was comprehended. Because self-classifications are not well differentiated within a domain, application of the strategy by experts produces poor calibration within a domain. Nonetheless, because self-classification is generally consistent with performance across domains, application of the strategy produces calibration across domains. GRA

N86-29502*# Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
EFFECT OF TIME SPAN AND TASK LOAD ON PILOT MENTAL WORKLOAD
S. L. BERG and T. B. SHERIDAN Mar. 1985 150 p
(Contract NAG2-227)
(NASA-CR-177099; NAS 1.26:177099) Avail: NTIS HC A07/MF A01 CSCL 05H

Two sets of experiments were run to examine how the mental workload of a pilot might be measured. The effects of continuous manual control activity versus discrete assigned mental tasks (including the length of time between receiving an assignment and executing it) were examined. The first experiment evaluated the strengths and weaknesses of measuring mental workload with an objective perforamance (altitude deviations) and five subjective ratings (activity level, complexity, difficulty, stress, and workload). The second set of experiments built upon the first set by increasing workload intensities and adding another performance measure: airspeed deviation. The results are discussed for both low and high experience pilots. B.G.

N86-29503*# California State Univ., Hayward. Dept. of Psychology.
HESITATIONS IN CONTINUOUS TRACKING INDUCED BY A CONCURRENT DISCRETE TASK
S. T. KLAPP, P. A. KELLY, and A. NETICK 1985 40 p
(Contract NCC2-223)
(NASA-CR-177019; NAS 1.26:177019) Avail: NTIS HC A03/MF A01 CSCL 05I

Subjects performed a continuous visually-guided pursuit tracking task with the right hand. From time to time (intervals averaging 30 sec) an auditory tone appeared signaling the subjects to perform a discrete response with the left hand. The presence of this tone was frequently associated with a hesitation in right-hand tracking which lasted 1/3 sec or longer. The rate of occurrence of these hesitations was about the same when the left-hand response involved a choice between competing responses as when the left hand responded in a predetermined direction. Hesitations occurred for three different mechanical tracking manipulanda using different controlling muscles, and appeared to be due to freezing rather than to relaxation of muscular action. The rate of occurrence of hesitations declined with practice, and this improvement in right-hand performance was accompanied by an improvement in performance of the concurrent left-hand response. The presence of hesitations, and their reduction with practice, can be interpreted within several viewpoints. Author

N86-29504*# California Univ., Los Angeles. School of Engineering and Applied Science.
MODEL-BASED APPROACHES FOR PARTITIONING SUBJECTIVE WORKLOAD ASSESSMENTS Final Technical Report
J. LYMAN Feb. 1986 19 p Presented at the Annual Conference of Manual Control, Jun. 1986
(Contract NAG2-216)
(NASA-CR-177030; NAS 1.26:177030) Avail: NTIS HC A02/MF A01 CSCL 05I

Modified Petri nets (MPNs) were investigated as a workload modeling tool. The MPN model was screened for general sensitivity to changes in workloads. A canonical correlation was conducted between the MPN parameters and the workload ratings. The results of the canonical correlation indicated that the MPN model of the experimental task represented the task components that influenced the subjective workload. B.G.

N86-29505*# Ohio State Univ., Columbus. Dept. of Aviation.
THE EFFECTS OF EXPRESSIVITY AND FLIGHT TASK ON COCKPIT COMMUNICATION AND RESOURCE MANAGEMENT Final Report, 1 Aug. 1982 - 31 Aug. 1985
R. S. JENSEN Jun. 1986 95 p
(Contract NCC2-206; RF PROJ. 76327/714794)
(NASA-CR-177036; NAS 1.26:177036; APL-86-1) Avail: NTIS HC A05/MF A01 CSCL 05I

The results of an investigation to develop a methodology for evaluating crew communication behavior on the flight deck and a flight simulator experiment to test the effects of crew member expressivity, as measured by the Personal Attributes Questionnarie, and flight task on crew communication and flight performance are discussed. A methodology for coding and assessing flight crew communication behavior as well as a model for predicting that behavior is advanced. Although not enough crews were found to provide valid statistical tests, the results of the study tend to indicate that crews in which the captain has high expressivity perform better than those whose captain is low in expressivity. There appears to be a strong interaction between captains and first officers along the level of command dimension of communication. The PAQ appears to identify those pilots who offer disagreements and inititate new subjects for discussion. Author

N86-29506# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
RAPID MEASUREMENT OF INDIVIDUAL STRESS REACTION LEVEL: DEVELOPMENT OF THE EMOTIONAL REACTION QUESTIONNAIRE (ESRQ)
G. LARSSON Jan. 1986 33 p In SWEDISH; ENGLISH summary
(FOA-C-50034-H3; ISSN-0347-7665; ESA-86-97044) Avail: NTIS HC A03/MF A01

A questionnaire which estimates the magnitude of the stress reaction of an individual in a given situation in less than a minute is described. Psychological coping potential can also be predicted. Derivation of the questionnaire from coping theory is outlined. The process of instrument development is described and instructions for usage and interpretation of the questionnaire are given. Normative data as well as assessments of reliability and validity are presented. ESA

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

A86-40483
THE IMPORTANCE OF STEREOSCOPIC IMAGERY IN FLIGHT SIMULATION
R. CLAPP (Boeing Military Airplane Co., Wichita, KS) IN: Simulators; Proceedings of the Conference, Norfolk, VA, March 3-8, 1985 . La Jolla, CA, Society for Computer Simulation, 1985, p. 174-178. refs

It is pointed out that one of the main problems in vision is the geometrical interpretation which an observer derives from the visual scene. The present paper is concerned with the various aspects of stereoscopic vision, taking into account applications to visual displays, and methods for producing stereoscopic images. Attention is given to problems of distance judgment, binocular vision, stereoscopic systems, and binocular vision in simulation. Judgment requirements related to aerial refueling are considered along with formation flight training, and low level flight training. Pilot and aircrew judgment of size and distance is found to be critical in many training scenarios, and stereoscopic display is particularly required for final training in initial training tasks and for continuation training. G.R.

A86-40486
VISUAL DISPLAY REQUIREMENTS FOR BOOM OPERATOR TRAINING IN AERIAL REFUELING
R. E. CLAPP (Boeing Military Aircraft Co., Wichita, KS) IN: Simulators; Proceedings of the Conference, Norfolk, VA, March 3-8, 1985 . La Jolla, CA, Society for Computer Simulation, 1985, p. 188-192. refs

This paper discusses the performance parameters of the visual system display for boom operator training in aerial refueling including field of view, resolution, brightness, contrast, color, stereopsis, image detail and display rates. These parameters are based upon extensive experience and study in aerial refueling operations and simulation. Such display systems have application in other simulation scenarios involving manipulation operations. Author

A86-40508
RECENT ADVANCES IN TELEOPERATION - IMPLICATIONS FOR THE SPACE STATION
M. M. CLARKE (Rockwell International Corp., Downey, CA) IN: Space tech; Proceedings of the Conference and Exposition, Anaheim, CA, September 23-25, 1985 . Dearborn, MI, Society of Manufacturing Engineers, 1985, p. 4-1 to 4-10. refs

The paper describes recent advances in teleoperation in nonaerospace hostile environments and discusses their applicability to space-related teleoperation. For example, remotely maintainable manipulators can increase system availability while continuing to exclude the crew from the hostile environment. Force reflection and supervisory control can reduce the operator's fatigue and workload. The Universal Master Controller can increase the system control flexibility. Author

A86-40521
EVA SUIT GLOVE DESIGN
B. PEACOCK, R. SHAMBAUGH, F. STRITZ (Oklahoma, University, Norman), and J. HORDINSKY (FAA, Oklahoma City, OK) IN: Space tech; Proceedings of the Conference and Exposition, Anaheim, CA, September 23-25, 1985 . Dearborn, MI, Society of Manufacturing Engineers, 1985, p. 8-14 to 8-25. refs

Traditional testing of gloves has been a subjective study by experienced designers and astronauts. An objective series of standardized tests were developed to test dexterity, strength, and tactility in a single-handed vacuum chamber. A finite element analysis simulates the effects of restraints and pleats at various glove pressures. For the finger, the incorporation of a lateral restraint and pleats on both the front and back of the joint led to near zero resistance to bending. A total glove model also was developed. A process was developed which used a computer to control the movement of an air jet to lay down continuous fiber on a fine mesh which overlaid a suction mechanism. With this technique, gloves can be quickly and economically produced with infinite selectibility of size, construction, and materials. Author

A86-40522* Worcester Polytechnic Inst., Mass.
THE WPI SPACE GLOVE DESIGN PROJECT
W. W. DURGIN, A. H. HOFFMAN, H. K. AULT, and F. C. LUTZ (Worcester Polytechnic Institute, MA) IN: Space tech; Proceedings of the Conference and Exposition, Anaheim, CA, September 23-25, 1985 . Dearborn, MI, Society of Manufacturing Engineers, 1985, p. 8-26 to 8-41. NASA-supported research.

Worcester Polytechnic Institute (WPI) was one of four colleges and universities awarded NASA grants for student design and development of an improved glove for space suits. This paper traces the design, development and testing of the WPI prototype glove. Test results showed that the glove did not significantly limit hand and finger motion when pressurized at 8 psi, except in the spherical grip mode. This project demonstrated that problems originating from space technology provide excellent vehicles for student learning and can generate creative solutions. Author

A86-40585#
ADVANCED EVA OPERATION ON-ORBIT TASKS AND SERVICES
F. J. ABELES and R. H. SCHAEFER (Grumman Corp., Bethpage, NY) IN: Space Systems Technology Conference, San Diego, CA, June 9-12, 1986, Technical Papers . New York, American Institute of Aeronautics and Astronautics, 1986, p. 60-68.
(AIAA PAPER 86-1175)

Methods for improving astronauts' productivity during extravehicular activity (EVA) are described. EVA operations involve construction, servicing, and maintenance of the Space Shuttle and servicing and maintenance of the Shuttle's payloads. EVA cycle tasks must be performed in the proper sequence and it is estimated that an astronaut can perform up to 6.5 hrs of EVA productive work during one EVA and a maximum of 19.5 hrs of EVA productive work per astronaut can be accomplished in a week. The utilization of dedicated work stations, a dedicated translation system, properly designed equipment, and job performance aids, such as the helmet mounted display (HMD), to increase EVA productive time is studied. The function and advantages of the HMD are examined. The need to consider the astronaut's comfort during performance of EVA tasks is discussed. I.F.

A86-41381
A DISCRETE CONTROL MODEL OF OPERATOR FUNCTION - A METHODOLOGY FOR INFORMATION DISPLAY DESIGN
C. M. MITCHELL (Georgia Institute of Technology, Atlanta) and R. A. MILLER (Ohio State University, Columbus) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-16, May-June 1986, p. 343-357. refs

Recent advances in computer technology and the changing rule of the human in complex systems require changes in design strategies for information displays. The use of discrete control models to represent the human operator's cognitive and decision making activities is described. The analytic procedures required to build a discrete control model show promise as a basis of a design methodology for the definition of an information display system for supervisory control tasks. The discrete control modeling procedures and their application for a simulated system is demonstrated. Author

N86-28291*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REVERSE OSMOSIS WATER PURIFICATION SYSTEM
H. G. AHLSTROM, P. S. HAMES, and F. J. MENNINGER *In its* The Telecommunications and Data Acquisition Report 10 p 15 May 1986
Avail: NTIS HC A10/MF A01 CSCL 06K

A reverse osmosis water purification system, which uses a programmable controller (PC) as the control system, was designed and built to maintain the cleanliness and level of water for various systems of a 64-m antenna. The installation operates with other equipment of the antenna at the Goldstone Deep Space Communication Complex. The reverse osmosis system was designed to be fully automatic; with the PC, many complex sequential and timed logic networks were easily implemented and are modified. The PC monitors water levels, pressures, flows, control panel requests, and set points on analog meters; with this information various processes are initiated, monitored, modified, halted, or eliminated as required by the equipment being supplied pure water. Author

N86-28618* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TORSO SIZING RING CONSTRUCTION FOR HARD SPACE SUIT Patent
H. C. VYKUKAL 10 Jun. 1986 9 p Filed 20 Dec. 1984 Supersedes N85-21987 (23 - 12, p 1910)
(NASA-CASE-ARC-11616-1; US-PATENT-4,593,415; US-PATENT-APPL-SN-684193; US-PATENT-CLASS-2-2.1A; US-PATENT-CLASS-2-2.1R; US-PATENT-CLASS-128-202.11; US-PATENT-CLASS-414-1; US-PATENT-CLASS-414-5; US-PATENT-CLASS-414-7; US-PATENT-CLASS-414-8) Avail: US Patent and Trademark Office CSCL 06Q

A hard suit for use in space or diving applications having an adjustable length torso covering that will fit a large variety of wearers is described. The torso covering comprises an upper section and a lower section which interconnect so that the covering will fit wearers with short torsos. One or more sizing rings may be inserted between the upper and lower sections to accomodate larger torso sizes as required. Since access of the astronaut to the torso covering is preferably through an opening in the back of the upper section (which is closed off by the backpack), the rings slant upward-forward from the lower edge of the opening. The lower edge of the upper covering section has a coupler which slants upward-forward from the lower edge of the back opening. The lower torso section has a similarly slanted coupler which may interfit with the upper section coupler to accomodate the smallest torso size. One or more sizing rings may be inserted between the coupler sections of the upper and lower torso sections to accomodate larger torsos. Each ring has an upper coupler which may interfit with the upper section coupler and a lower coupler which may interfit with the lower section coupler. NASA

N86-28619* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ELBOW AND KNEE JOINT FOR HARD SPACE SUITS Patent
H. C. VYKUKAL 8 Jul. 1986 13 p Filed 30 Dec. 1984 Supersedes N85-20666 (23 - 11, p 1697)
(NASA-CASE-ARC-11610-1; US-PATENT-4,598,427; US-PATENT-APPL-SN-684190; US-PATENT-CLASS-2-2.1A; US-PATENT-CLASS-2-2.1R; US-PATENT-CLASS-285-168; US-PATENT-CLASS-138-120) Avail: US Patent and Trademark Office CSCL 06Q

An elbow or knee joint for a hard space suit or similar usage is formed of three serially connected rigid sections which have truncated spherical configurations. The ends of each section form solid geometric angles, and the sections are interconnected by hermetically sealed ball bearings. The outer two sections are fixed together for rotation in a direction opposite to rotation of the center section. A preferred means to make the outer sections track each other in rotation comprises a rotatable continuous bead chain which engages sockets circumferentially spaced on the facing sides of the outer races of the bearings. The joint has a single pivot point and the bearing axes are always contained in a single plane for any articulation of the joint. Thus flexure of the joint simulates the coplanar flexure of the knee or elbow and is not susceptible to lockup. NASA

N86-28620* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SHOULDER AND HIP JOINT FOR HARD SPACE SUITS Patent
H. C. VYKUKAL 17 Jun. 1986 11 p Filed 20 Dec. 1984 Supersedes N85-21986 (23 - 12, p 1910)
(NASA-CASE-ARC-11543-1; US-PATENT-4,594,734; US-PATENT-APPL-SN-684192; US-PATENT-CLASS-2-2.1A; US-PATENT-CLASS-414-7; US-PATENT-CLASS-285-168; US-PATENT-CLASS-138-120) Avail: US Patent and Trademark Office CSCL 06Q

Shoulder and hip joints for hard space suits are disclosed which are comprised of three serially connected truncated spherical sections, the ends of which converge. Ball bearings between the sections permit relative rotation. The proximal end of the first section is connected to the torso covering by a ball bearing and the distal end of the outermost section is connected to the elbow

or thigh covering by a ball bearing. The sections are equi-angular and this alleviates lockup, the condition where the distal end of the joint leaves the plane in which the user is attempting to flex. The axes of rotation of the bearings and the bearing mid planes are arranged to intersect in a particular manner that provides the joint with a minimum envelope. In one embodiment, the races of the bearing between the innermost section and the second section is partially within the inner race of the bearing between the torso and the innermost spherical section further to reduce bulk.
NASA

N86-28621# Army Belvoir Research and Development Center, Fort Belvoir, Va.
DEVELOPMENT OF U.S. ARMY REVERSE OSMOSIS WATER PURIFICATION EQUIPMENT Final Report, 1950 - 1985
D. C. LINDSTEN Jan. 1986 76 p
(AD-A165667; BRDC-2418) Avail: NTIS HC A05/MF A01 CSCL 13B

The United States Army has developed and field-tested a 600-gal/h Reverse Osmosis Water Purification Unit (ROWPU). In addition, it has procured a 150,000-gal/d ROWPU, and has under development a 3000-gal/h ROWPU. These units are capable of purifying raw water, seawater, brackish water, and water contaminated with nuclear, biological, and chemical (NBC) warfare agents.
GRA

N86-28622# Armed Forces Food Science Establishment, Scottsdale (Australia).
EVALUATION OF WATER STERILIZING TABLETS
G. F. THOMSON, K. W. JAMES, G. E. DRIVER, and A. T. HANCOCK Aug. 1985 22 p
(AD-A165806; AFFSE-2/85) Avail: NTIS HC A02/MF A01 CSCL 13B

Water sterilizing tablets were evaluated for their efficiency in killing micro-organisms. The effect of inhibitors and palatability were investigated. The effect of long term use is discussed. The water sterilizing tablet recommended for disinfection of personal drinking water is the Potable Aqua tablet. The Afses is not recommended because of its need for a quiescent period. The Puritabs is not recommended because of its inability to achieve the required 99.9% kill in heavily contaminated water, especially at alkaline pH values. Fortified beverage powders, which are effective detasting agents, will inactivate the disinfecting agent if added before completion of the recommended contact period.
GRA

N86-28623# Lawrence Livermore National Lab., Calif.
SUIT PENETRATION STUDY: PRELIMINARY ANALYSIS OF FLOW ABOUT A CIRCULAR CYLINDER
R. C. MCCALLEN and S. B. SUTTON 27 Nov. 1985 28 p
(Contract W-7405-ENG-48)
(DE86-005760; UCID-20636) Avail: NTIS HC A03/MF A01

The flow of atomized droplets around a circular cylinder (representing a human torso) is modeled. Two different computer codes have been used to generate solutions for the flow field: a finite difference code and a vertex method code. The finite difference code, CONCHAS-SPRAY (C-S), handles unsteady, viscous, compressible flow. The second code, KPD3, simulates unsteady, high Reynolds number, incompressible separated flow with an inviscid outer flow. The specific flow problem considered is described, followed by the results of a literature search for experimental data.
DOE

N86-29507*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SHOULDER AND HIP JOINTS FOR HARD SPACE SUITS AND THE LIKE Patent
H. C. VYKUKAL 8 Jul. 1986 12 p Filed 20 Aug. 1984 Supersedes N84-33021 (22 - 22, p 3633)
(NASA-CASE-ARC-11534-1; US-PATENT-4,598,428; US-PATENT-APPL-SN-642602; US-PATENT-CLASS-2-2.1A; US-PATENT-CLASS-285-168; US-PATENT-CLASS-285-184; US-PATENT-CLASS-285-227; US-PATENT-CLASS-138-120; US-PATENT-403-164) Avail: US Patent and Trademark Office CSCL 06Q

For use in hard space suits and the like, a joint between the torso covering and the upper arm covering (i.e., shoulder) or between the torso covering and upper leg covering (i.e., hip) is disclosed. Each joint has an outer covering and a inner covering. The outer covering has plural perferably truncated toroidal sections decreasing in size proceeding outwardly. In one embodiment at each joint there are two bearings, the first larger than the second. The outer race of the larger bearing is attached to the outer edge of the smaller end of each section and the inner race of the larger bearing is attached to the end wall. The inner race of the smaller bearing is attached to the end wall. The outer race of the smaller bearing is attached to the larger end of the next section. Each bearing hask appropriate seals. Between each section is a rubber ring for the comfort of the wearer. Such rubber rings have radial flanges attached to the inner races of two adjacent bearings. Matching semicircular grooves are formed in the abutting overlapping surfaces. Bellows-like inner walls are also provided for each section fixed at one end to an inner cylindrical flange and, at the opposite end, to an end wall. Each outer section may rotate 360 deg relative to the next outer section, whereas the bellows sections do not rotate, but rather expand or contract locally as the rigid sections rotate relative to each other.
NASA

N86-29508*# Georgia Inst. of Tech., Atlanta. Center for Man-Machine Systems Research.
PILOT INTERACTION WITH AUTOMATED AIRBORNE DECISION MAKING SYSTEMS Semiannual Progress Report, Mar. - Aug. 1984
W. B. ROUSE, J. M. HAMMER, N. M. MORRIS, A. E. KNAEUPER, E. N. BROWN, C. M. LEWIS, and W. C. YOON Aug. 1984 45 p
(Contract NAG2-123)
(NASA-CR-177002; NAS 1.26:177002) Avail: NTIS HC A03/MF A01 CSCL 05H

Two project areas were pursued: the intelligent cockpit and human problem solving. The first area involves an investigation of the use of advanced software engineering methods to aid aircraft crews in procedure selection and execution. The second area is focused on human problem solving in dynamic environments, particulary in terms of identification of rule-based models land alternative approaches to training and aiding. Progress in each area is discussed.
B.G.

N86-29509*# Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
EFFECTS OF CONSUMING VARIOUS FOODS AND NUTRIENTS ON OBJECTIVE AND SUBJECTIVE ASPECTS OF HUMAN PERFORMANCE AND BEHAVIOR Final Report, 1 Sep. 1983 - 31 Aug. 1984
R. J. WURTMAN and H. R. LIEBERMAN 31 Aug. 1984 10 p
(Contract NAG2-132)
(NASA-CR-177003; NAS 1.26:177003) Avail: NTIS HC A02/MF A01 CSCL 06H

A variety of behavioral tests were established and studies performed on young healthy subjects who received tryptophan, tyrosine or placeboes and on young and old subjects receiving protein and carbohydrate meals. The behavioral effect of the homone melatonin on human circadian rhythms was examined. The results are discussed.
B.G.

N86-29510# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics and Logistics Dept.
THE SCIENTIFIC/ENGINEERING WORKSTATION EXPERIMENT: PRELIMINARY RESULTS, CONCLUSIONS AND RECOMMENDATIONS Progress Report, Apr. - Aug. 1984
R. T. VANESELTINE and M. B. MARQUARDT Dec. 1985 35 p (AD-A163059; DTNSRDC/CMLD-85/05) Avail: NTIS HC A03/MF A01 CSCL 05I

A Scientific/Engineering Workstation Experiment is being conducted to determine the characteristics of workstations which would significantly improve the productivity of scientists and engineers in the Naval Laboratories. This report discusses the evaluation methodology and results. Furthermore, the report presents preliminary comments and recommendations for scientific/engineering workstation specifications. The initial results of the experiment are based on the time interval from April to August, 1984. Four major preliminary conclusions were reached. First, workstations can be effectively used for real projects. Second, the individual scientists or engineer's working environment plays an important role in the utilization of a workstation. Third, certain features and capabilities were found to be used by scientists and engineers on certain features and capabilities were found to be used by scientists and engineers on almost all workstations. Finally, workstation specifications should be primarily based on performance requirements that insure the actual needs of scientists and engineers are met. GRA

N86-29511# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
ANTHROPOMETRY RESEARCH PROGRAM
A. AVEN, S. DAHLMAN, and L. SPERLING Dec. 1985 51 p In SWEDISH; ENGLISH summary Sponsored by Swedish Work Environment Fund
(FOA-C-50032-H2; ISSN-0347-7665; ESA-86-97043) Avail: NTIS HC A04/MF A01

Swedish anthropometry investigations; collecting data on stature and body weight of people in Sweden; methods for comparing the body dimensions of different groups of people; and the use of anthropometry when designing equipment and enviroments were discussed. ESA

N86-29512# Centre d'Essais en Vol, Istres (France). Lab. de Medecine Aerospatiale.
THE CHOICE OF SEAT BACK ANGLE TO IMPROVE ACCELERATION TOLERANCE
J. M. CLERE, H. VIEILLEFOND, and J. L. POIRIER Oct. 1985 51 p
(Contract DRET-82-1131)
(CEV-70-209; ESA-86-97195) Avail: NTIS HC A04/MF A01

The optimization of pilot seat back angle at accelerations of 7.8 to 9 g was studied using centrifugal simulation facilities. The physiological parameters such as heart rate, blood pressure, and visual field were measured at seat back angles from 30 to 60 deg. It is shown that the seat back angle of 60 deg eliminates visual problems at 9 g and protects against blood circulation problems. Angles of 30 deg produce clear intolerance symptoms. ESA

N86-29513*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE TELEOPERATION RESEARCH. AMERICAN NUCLEAR SOCIETY EXECUTIVE CONFERENCE: REMOTE OPERATIONS AND ROBOTICS IN THE NUCLEAR INDUSTRY; REMOTE MAINTENANCE IN OTHER HOSTILE ENVIRONMENTS
A. J. MEINTEL, JR. and R. W. WILL 1985 51 p Presented at the Executive Conference on Remote Operations and Robotics in the Nuclear Industry, Pine Mountain, Ga., 21 Apr. 1985
(NASA-TM-89234; NAS 1.15:89234; DE85-902186; CONF-850425-5) Avail: NTIS HC A04/MF A01 CSCL 05H

This presentation consists of four sections. The first section is a brief introduction to the NASA Space Program. The second portion summarized the results of a congressionally mandated study of automation and robotics for space station. The third portion presents a number of concepts for space teleoperator systems. The remainder of the presentation describes Langley Research Center's teleoperator/robotic research to support remote space operations. DOE

55

PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-28624*# National Aeronautics and Space Administration, Washington, D.C.
MODIFICATION OF CYTOGENETIC AND PHYSIOLOGICAL EFFECTS OF SPACE FLIGHT FACTORS BY BIOLOGICALLY ACTIVE COMPOUNDS
A. A. ALIYEV, E. R. MEKHTI-ZADE, A. L. MASHINSKIY, and U. K. ALEKPEROV Jul. 1986 14 p Transl. into ENGLISH from Zhurnal Obshchey Biologii (USSR), v. 47, no. 2, Mar. - Apr. 1986 p 246-251 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASW-4004)
(NASA-TM-87987; NAS 1.15:87987) Avail: NTIS HC A02/MF A01 CSCL 06C

Physiological and cytogenetic changes in the Welsh onion plants induced by a short (82 days) and long term (522 days) space flight are expressed in decrease of seed germination, inhibition of stem growth, depression of cell division in root meristem, and increase in the number of structural chromosome rearrangements. The treatment of such plants with solutions of a-tocopherol, auxin, and kinetin decreased the level of chromosome aberrations to the control one and normalized cell divisions and growth partly or completely. Author

N86-28625*# National Aeronautics and Space Administration, Washington, D.C.
MONKEYS AS A SOURCE OF VIRAL DISEASES IN MAN
E. R. PILLE May 1986 14 p Transl. into ENGLISH from Voprosy Virusologii (USSR), v. 30, issue 2, Mar. - Apr. 1985 p 138-144 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASW-4004)
(NASA-TM-78017; NAS 1.15:78017) Avail: NTIS HC A02/MF A01 CSCL 06C

Under institutional scientific-research conditions, during contact with monkeys or their tissues, there is a danger of infection of the associates by simian viruses which are pathogenic to man. Presented in this paper is information on these stimulants. Author

N86-28626# Bundesministerium fuer Forschung und Technologie, Bonn (West Germany).
APPLIED BIOLOGY AND BIOTECHNOLOGY, THE PROGRAM OF THE FEDERAL GOVERNMENT, 1985-1988 [ANGEWANDTE BIOLOGIE UND BIOTECHNOLOGIE PROGRAMM DER BUNDESREGIERUNG 1985-1988]
Oct. 1985 82 p In GERMAN Original contains color illustrations
(ESA-86-96938) Avail: NTIS HC A05/MF A01

The program of the German Federal Government in the fields of applied biology is outlined. The measures taken by the government to intensify biotechnology basic research, and to provide research and economic conditions for an improved application of biotechnology are discussed. International cooperation in the domain is presented. The financial planning of the government for the stimulation of research in the fields of applied biology and biotechnology is presented. ESA

N86-28868# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin.

EXOBIOLOGICAL ASPECTS IN VIEW OF TITAN

G. HORNECK *In* ESA The Atmospheres of Saturn and Titan p 157-159 Dec. 1985

Avail: NTIS HC A14/MF A01

Contributions of Cassini mission data on Titan's atmosphere to exobiology are discussed. Cassini can study the nature, abundance and degree of complexity of organic molecules including the occurrence of chirality in the clouds, on the surface of Titan, or submerged in its ocean; the transient stages and the mechanisms of organic molecule formation; and the similarities of organic compounds and of their formation processes from different cosmic sources. ESA

N86-28871# Centre National de la Recherche Scientifique, Orleans (France). Centre de Biophysique Moleculaire.

SEARCH FOR CHIRAL MOLECULES AND OPTICAL ACTIVITY IN EXTRATERRESTRIAL SYSTEMS. THE CASSINI MISSION OPPORTUNITY

A. BRACK and G. SPACH (Rouen Univ. France) *In* ESA The Atmospheres of Saturn and Titan p 189-191 Dec. 1985

Avail: NTIS HC A14/MF A01

The genesis of homochiral systems and the conditions which dictate the choice of a given set of enantiomers rather than the antipode are discussed. Examination of extraterrestrial organic molecules may give clues if life based on carbon chemistry is sought. Where life is expected to exist (Mars), the detection of optical activity may be a good indication of its presence. The situation is different on Titan which is still in its phase of chemical evolution. The most simple possible derivatives devoid of oxygen atoms are listed. Search for optical activity on Titan raises difficult technical problems which, once solved, may be helpful for further exploration of other planets. ESA

N86-29514# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin.

PROCEEDINGS AND PROGRAM DRAFT IN GRAVITATIONAL BIOLOGY IN THE FEDERAL REPUBLIC OF GERMANY

Oct. 1985 194 p In GERMAN; ENGLISH summary Conference held in Cologne, West Germany, 14-15 Jun. 1985 Report will also be announced as translation (ESA-TT-988)

(DFVLR-MITT-85-16; ISSN-0176-7739; ESA-86-96885) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The effects of weightlessness on animal organisms to better understand effects on human body during space flights are discussed. Investigations on vertebrate physiology, reproduction, genetics, neurobiology, and behavioral and motion physiology are proposed.

ESA

N86-29515# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Bereich fuer Projekttraegerschaften.

THE ROLE OF THE DFVLR PROJECT MANAGEMENT LIFE SCIENCES IN THE SPACE PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY

F. DAHL *In its* Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) p 9-20 Oct. 1985 In GERMAN; ENGLISH summary

Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The German space program in cooperation with ESA and NASA is focussed on Spacelab 1 mission, on Eureca mission, the Long Duration Exposure Facility, the International Microgravity Laboratory, Spacelab D2 mission, as well as on bioracks, European Radiation Assembly and Human Physiology Laboratory. Experiments are carried out in radiobiology, exobiology, physiology, botany, microbiology, rhythmic processes, and biotechnology. The DFVLR project management and the experiment/project selection procedure by scientific advisory committees are presented. ESA

N86-29516# Stuttgart Univ. (West Germany). Abt. Bioenergetik.

A THEORETICAL CONCEPT FOR STATE CHANGES AND SHAPE CHANGES IN WEIGHTLESSNESS

R. J. STRASSER *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) p 23-31 Oct. 1985 In GERMAN; ENGLISH summary

Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

A theoretical concept for state and shape changes in weightlessness based on thermodynamics principles for open systems is developed. The influence of light, temperature, pressure, and gravity on the shape and state of a biological system, and therefore on the phenotype with steady genome are studied. Experiments are carried out on leaves, chloroplasts, neurospores and mammalian cell spheroids. An experimental module for cellular biology was built for automatic optical and electrode measurements. The data are recorded, stored, and processed at a ground station. Experiments in space stations are recommended to study the influence of gravity and geomagnetism on the shape and the biochemical processes of a biological system and to obtain data on the phylogenesis of more complicated organisms. ESA

N86-29517# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin.

SOME REMARKS ON GRAVITATIONAL BIOLOGY

W. BRIEGLEB *In its* Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) p 33-44 Oct. 1985 In GERMAN; ENGLISH summary

Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

A functional system including direct/primary, indirect/secondary and various indirect/tertiary interactions between an organism and gravity was developed to study the genetic and phylogenic consequences of gravity on animals living in water or on land. Gravity influences the gravity receptors leading to humoral or neuronal responses according to cell or proprioreceptor excitation. The immersed condition with no indirect gravity influence is compared with real weightlessness to analyze gravity direct influence on an isolated cell function or on a bunch of cells in egg ontogenesis and to analyze the effects of gravity on statocyst differentiation. In animals living on land, the antigravity structures and functions are influenced by gravity. The mutational effects of gravity leading to gene evolution through neuronal and functional morphological responses are presented. Hypergravity and weightlessness should be further studied. ESA

N86-29518# Konstanz Univ. (West Germany). Biologische Fakultaet.

INVESTIGATIONS OF PARAMECIUM CELLS ANALYZED UNDER MICROGRAVITY CONDITIONS

H. PLATTNER *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) p 47-52 Oct. 1985 In GERMAN; ENGLISH summary

Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Paramecium tetraureiia cells were studied using light microscopy, video recording, amino-ethyl dextran as redocking trigger agent and electronic microscopy to analyze exocytosis movements, redocking cycles on the cellular membrane and trichocyst building-up for 12 hr. The relationship between trichocyst ejection and motion behavior under microgravity conditions is studied using behavior mutants and secretion mutants to assess the negative or positive selection pressure of trichocyst presence or absence. ESA

N86-29519# Bonn Univ. (West Germany). Zoologisches Inst.
THE ORIGIN OF THE SPICULE SKELETON OF FRESH WATER SPONGES (SPONGILLIDES)
N. WEISSENFELS *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 53-56 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Young fresh water sponges cultivated in laboratory in constant temperate water and in ambient temperature were used to study the origin of the sponge spicule skeleton. The SiO2 spicules are formed in scleroblasts. Aged spicules leave the scleroblasts and are transported by transport cells to their functional location where they adhere to the base plate through epongin which ensures their stability. The life cycle of the spongillides throughout the seasons is described. The influence of gravity on the development of young sponges should be studied. ESA

N86-29520# Cologne Univ. (West Germany). Zoologisches Inst.
LIMB REGENERATION IN AMPHIBIANS, A SUITABLE MODEL FOR INVESTIGATIONS OF THE EFFECTS OF WEIGHTLESSNESS AS REGARDS EVOLUTION AND MODIFICATIONS
H. J. ANTON *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 63-68 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Limb regeneration in urodeles, amphibians which have experienced a phylogenetic evolution to overcome the effects of gravity, was studied to analyze the long term effects of weightlessness depending on environmental conditions and on gene activation. The study gives data on evolution processes and phylogenesis under weightlessness, on calcium exchange, and physiological regeneration of the skeleton as supporting and moving apparatus. ESA

N86-29521# Ruhr Univ., Bochum (West Germany). Fakultaet fuer Biologie.
INVESTIGATIONS OF THE REPRODUCTIVE PHYSIOLOGY OF THE RAINBOW TROUT (SALMO GAIRDNERI RICHARDSON)
V. BLUEM and R. SCHULZ *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 69-73 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Morphological and endocrinal investigations on the reproductive physioiogy of the rainbow trout of either sex were performed to study hypothalamic production of gonadotropin releasing hormone (GnRH) using histological and histometrical analysis, to demonstrate the presence of gonadotrop hormone receptors (GTH-receptors) in testes and ovaries based on radioimmunological quantification and using the immunofluorescent technique. An in vitro system for gonad tissues was developed to study steroid genesis in short-time cultures. The effects of puberty in rainbow trout on material exchange are studied. Ethiological studies were carried out to determine the influence of sexual and/or parental phases. The morphological control of gametogenesis in micro-g environment is recommended as well as in vivo and in vitro investigations of reproduction-dependent hormonal systems. ESA

N86-29522# Essen Univ. (West Germany). Abt. fuer Zoophysiologie.
CHANGES IN THE MORPHOLOGICAL AND MOLECULAR BIOLOGICAL PROCESSES DURING EARLY EMBRYO DEVELOPMENT IN AMPHIBIANS UNDER MICRO G CONDITIONS
H. GRUNZ *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 75-80 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The effects of micro-g conditions on vegetative polarity (absence of change) in aging oocytes over 2 months were studied to determine the role of gene regulatory factors and the changes in nucleus-cytoplasm interactions. Cell affinity and induction should be investigated under micro-g conditions to study the processes of reaggregation between ectoderm and endoderm and the changes in the standard structure so as to understand normal and pathological embryo development. ESA

N86-29523# Giessen Univ. (West Germany). Genetischen Inst.
XIPHOPHORUS: A SYSTEM TO RECOGNIZE RADIATION-INDUCED MUTATIONS AND TO STUDY THE EFFECTS OF ZERO-GRAVITY ENVIRONMENT ON EMBRYO DEVELOPMENT
C. R. SCHMIDT and F. ANDERS *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 81-85 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The reproduction physiology of Xiphophorus is described. Laboratory mutants constitute a system of 60 stable and genetically determined species. Resulting from their crossbreeding melanomas appear due to a disorded oncogene. The Xiphophorus system is studied to determine the oncogene characteristics, regulation and transmission. Studies on Xiphophorus under weightlessness are recommended: influence of 0-g environment on skeleton and skeletonmuscle structure; epigenetic and/or genetic effects of 0-g environment on embryogenesis in vivo and in vitro; and the effects of the combined action of cosmic radiation and weightlessness on embryos, sub-adult and adult animals of the mutation-sensitive Xiphophurus test species to investigate mutagenesis and teratogenesis. ESA

N86-29524# Luebeck Univ. (West Germany). Inst. fuer Physiologie.
HYPOXIC HYPOXIA AS A STIMULUS OF ERYTHROPOIESIS IN VIVO AND IN VITRO
W. JELKMANN *In* DFVLR Proceedings and program draft in Gravitational Biology in the Federal Republic of Germany p 95-100 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The action of weightlessness on red blood volume in astronaut's anemia and on erythropoiesis leading to increased hemolysis is studied. Several generations of mice and rats bred in weightlessness were studied to determine the effects of weightlessness on the erythropoetic tissues, on erythropoiesis and on calcification. Causes of astronaut's anemia are listed. The effects of weightlessness on the erythropoietic system ontogenesis were measured based on circulative blood and erythrocyte volumes, the functional integrity of the hematopoietic tissue and the capacity of the erythropoietic system to react to hypoxia. ESA

N86-29525# Marburg Univ. (West Germany). Arbeitsgruppe Verhaltensphysiologie.
A LEARNING MODEL AS A BASIS FOR INVESTIGATIONS OF THE EFFECTS OF GRAVITY ON THE LEARNING PROCESSES AND MEMORY FORMULATION
C. BUCHHOLTZ *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 107-113 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The effects of gravity on learning strategy were studied using conditioned mice and a data acquisition computer system recording the daily performance of each mouse. The records are used to develop learning models. Increased gravity causes changes in the functional relationship between data storage units. These changes depend on the calculation result of proprioceptive feedbacks, and on time dependent effects represented by transmission of data from a short term memory related to the biophysical phase to long term memory related to the biochemical phase. ESA

N86-29526# Duesseldorf Univ. (West Germany). Inst. fuer Physikalische Biologie.
LONG-TERM ADAPTATION OF THE OTOLITH ORGANS
R. ECKMILLER *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 115-120 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Reduction in sensitivity of otolith organs in primates before a space mission and methods to reduce it were investigated to avoid space motion sickness. A procedure should be developed under neurophysiological control of the otolith afferences to influence the size and location of otoconia. ESA

N86-29527# Ulm Univ. (West Germany). Abt. Neurologie.
FUNCTIONAL DEVELOPMENT OF GRAVITY RECEPTORS IN INSECTS AND AMPHIBIANS
E. HORN *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 121-128 Oct. 1985 In GERMAN; ENGLISH summary Sponsored by Deutsche Forschungsgeimschaft
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Insects using a proprioceptive system and amphibians using a statocyst system were studied to analyze the functional development of a sensory system and its influence of the body muscle structure. The effects of micro-g through gravity receptors on the efficiency of the sensory system, on the adaptative mechanisms of the neuronal development under changing living conditions or under the animal pathological conditions, and on the hormonal environment are studied. The studies are based on eye reflex (Xenopus) and head reflex (Gryllus) and on equilibrium observations. ESA

N86-29528# Stuttgart Univ. (West Germany). Inst. fuer Zoologie.
FUNCTION-DEPENDENT PLASTICITY IN THE NERVOUS SYSTEM
H. RAHMANN and W. PROBST *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 135-139 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The tectum opticum of fish midbrain is studied to demonstrate the involvement of gangliosides in the functional plastic changes in synaptic systems and in visual acuity. The structural synaptic plasticity after light variations involving synaptic vesicles and after temperature variations involving the nervous system are studied using differential quantitative light and electronic microscopes. The biochemical neuronal plasticity after temperature variations involves sialo-glycoconjugate bonds and gangliosides. The molecule basic properties are determined using the monolayer technique for physico-chemical in vitro experiments with various neuronal membrane lipids combined with calcium ions. Further investigations are recommended to study neuronal plasticity in reduced or in absence of gravity. ESA

N86-29529# Bonn Univ. (West Germany). Zoologisches Inst.
MORPHOLOGY AND DEVELOPMENT OF THE INNER EAR OF ANURANS
H. SCHNEIDER and I. HERTWIG *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 141-146 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The Anuran inner ear consists of five sensory sections for orientation in space and perception of acoustic signals. Utriculus, sacculus and lagena are gravity receptors possessing otoliths. The ampullae of the semicircular canals are responsible for rotation sense. Papillia basilaris and papilla amphiborum allow respectively perception of high frequencies and low frequencies. The development of the labyrinth in amphibians begins after neurulation. The receptors consist of sensory cells and support cells. Experiments in simulated weightlessness show that the development of sensory epithelia and otoliths do not depend on gravity and should be confirmed by experiments in space. ESA

N86-29530# Bielefeld Univ. (West Germany). Abt. Neuroanatomie.
QUESTIONS ON THE EVOLUTION OF THE DEVELOPMENTAL PROGRAM OF THE VERTEBRATE INNER EAR UNDER LONG TERM ZERO G CONDITIONS
B. FRITZSCH *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 151-156 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The long-term effects of weightlessness on the formation and function of the vestibular system are studied with particular focus on the persistence of motion defects of larva up to adult age, on the reproduction function, on the adaptation or selection of the offspring and hybrids resulting from successful reproduction under weightlessness, and on the sensory epithelium differentiation. The structural changes of the inner ear in adapted or selected offspring are studied using electronic microscope and the afferent and efferent connections using tracer methods. High generation succession frequency and offspring number, applicable reproductive behavior and easy culture, and live food are the minimum requirements for program implementation. ESA

N86-29531# Kiel Univ. (West Germany). Inst. fuer Meereskunde.
LONG DURATION CONFINEMENT OF AQUATIC ORGANISMS IN WEIGHTLESSNESS (AQUASPACE)
R. FROESE *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 159-164 Oct. 1985 In GERMAN; ENGLISH summary
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

A confinement facility resulting from the study of the transition phase between water and air was developed to study aquatic organisms in weightlessness. The facility is a closed system filled with water and consists of a central supply unit, confinement tanks, a lock system, a computer system for food supply control and measurement processing, videocameras monitoring growth, reproduction and behavior of the aquatic organisms, and two chambers to remove the gases released in water through a diffusion membrane and store oxygen in a gas mixture. The facility can be used to study the catabolism of the aquatic organisms in weightlessness and the effects of weightlessness and radiation on the reproduction biology. ESA

N86-29532# Ulm Univ. (West Germany). Abt. Neurologie.
PROGRAM DRAFT FOR A SPECIAL FIELD: GRAVITATIONAL BIOLOGY
E. HORN *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) p 173-189 Oct. 1985 In GERMAN
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Gravitational biology as a special field for fundamental research on organism biology in weightlessness is discussed. Cellular and molecular biology, genetics; reproduction and development biology; vegetative biology and matter exchange biology; neurobiology; behavioral and motion physiology; population genetics, and evolution biology, and ecology and life preservation systems are suitable fields of research. The cooperation between the different field specialists and experts can contribute to the knowledge of body stabilization and plasticity and adaptativity in weightlessness. ESA

N86-29533# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF 60 HZ ELECTRIC FIELDS ON OPERANT AND SOCIAL STRESS BEHAVIOR OF NONHUMAN PRIMATES Quarterly Technical Progress Report, 28 Sep. - 20 Dec. 1985
W. R. ROGERS 3 Jan. 1986 5 p
(Contract DE-AC02-80RA-50219)
(DE86-005067; DOE/RA-50219/T7; QTPR-20) Avail: NTIS HC A02/MF A01

This research program will evaluate the aversive character of exposure to 60 Hz electric fields by determining the threshold intensity which produces avoidance or escape responses, will estimate the threshold intensity for detection of 60 Hz electric fields, will assess effects of chronic exposure to 60 Hz electric fields on the performance of two operant conditioning tasks, fixed ratio and differential reinforcement of low rate responding, will investigate, using the systematic quantitative observational sampling methods of primatology, the possible stress-inducing effects of chronic exposure to 60 Hz electric fields on the behavior of baboons living in small social groups. In all experiments, the electric fields will be described, characterized, and controlled to account for recognized artifacts associated with high intensity 60 Hz electric fields and the health of all subjects will be described using the methods of primate veterinary medicine. DOE

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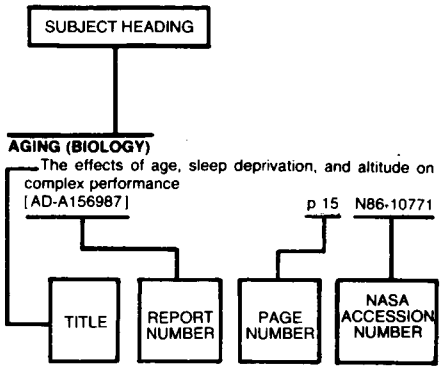

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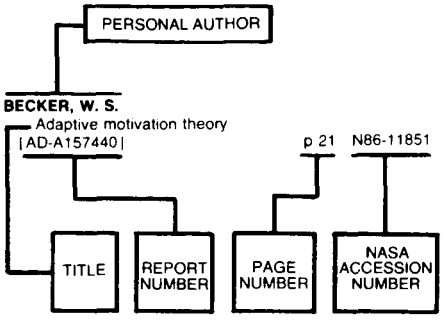

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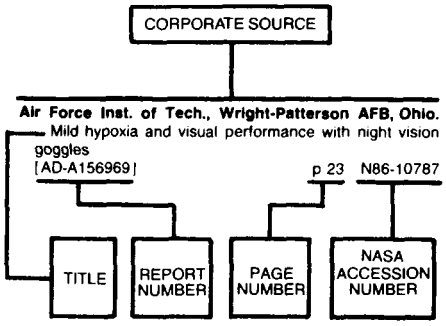

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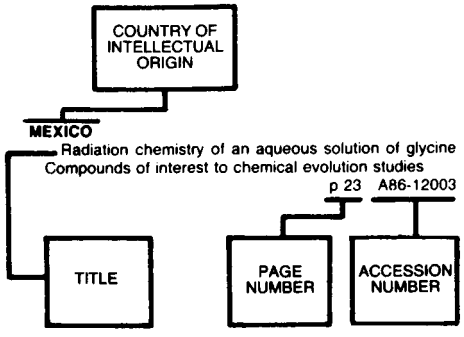

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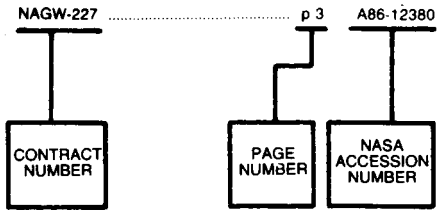

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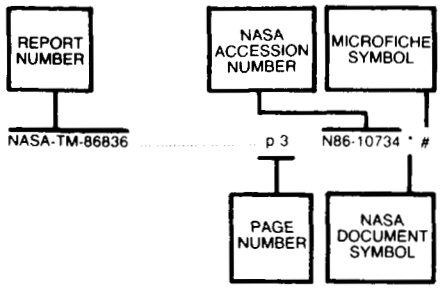

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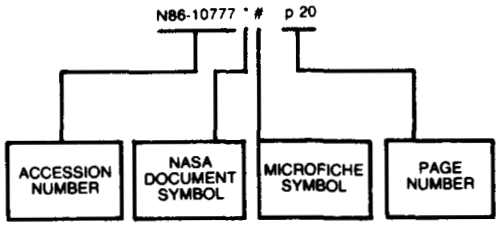

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A01	Microfiche	$ 5.95	$11.90
A02-A03	001-050	9.95	19.90
A04-A05	051-100	11.95	23.90
A06-A09	101-200	16.95	33.90
A10-A13	201-300	22.95	45.90
A14-A17	301-400	28.95	57.90
A18-A21	401-500	34.95	69.90
A22-A25	501-600	40.95	81.90
A99	601-up	*	*
NO1		$40.00	70.00
NO2		40.00	70.00

Schedule E
EXCEPTION PRICE DOCUMENTS AND MICROFICHE

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
E01	$ 7.50	15.00
E02	10.00	20.00
E03	11.00	22.00
E04	13.50	27.00
E05	15.50	31.00
E06	18.00	36.00
E07	20.50	41.00
E08	23.00	46.00
E09	25.50	51.00
E10	28.00	56.00
E11	30.50	61.00
E12	33.00	66.00
E13	35.50	71.00
E14	38.50	77.00
E15	42.00	84.00
E16	46.00	92.00
E17	50.00	100.00
E18	54.00	108.00
E19	60.00	120.00
E20	70.00	140.00
E99	*	*

*Contact NTIS for price quote.

IMPORTANT NOTICE

NTIS Shipping and Handling Charges (effective June 1, 1985)

U.S., Canada, Mexico — ADD $3.00 per TOTAL ORDER

All Other Countries — ADD $4.00 per TOTAL ORDER

Exceptions — Does NOT apply to:

ORDERS REQUESTING NTIS RUSH HANDLING
ORDERS FOR SUBSCRIPTION OR STANDING ORDER PRODUCTS *ONLY*

NOTE: Each additional delivery address on an order requires a separate shipping and handling charge.